ELECTRICAL CONTRACTING

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OCTOBER, 1937

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With which is consolidated The Electragist and Electrical Record
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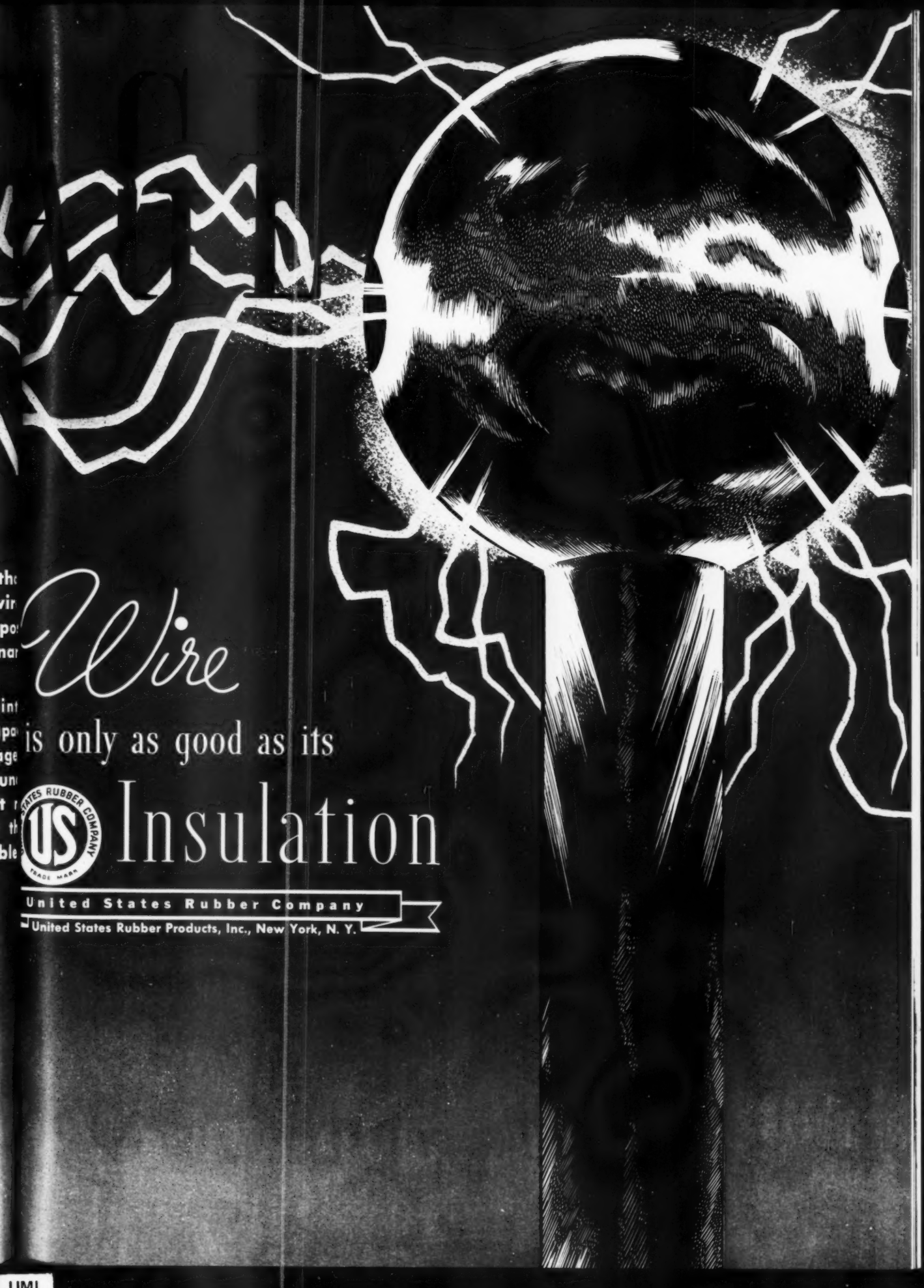
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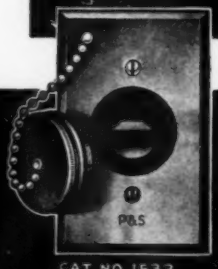
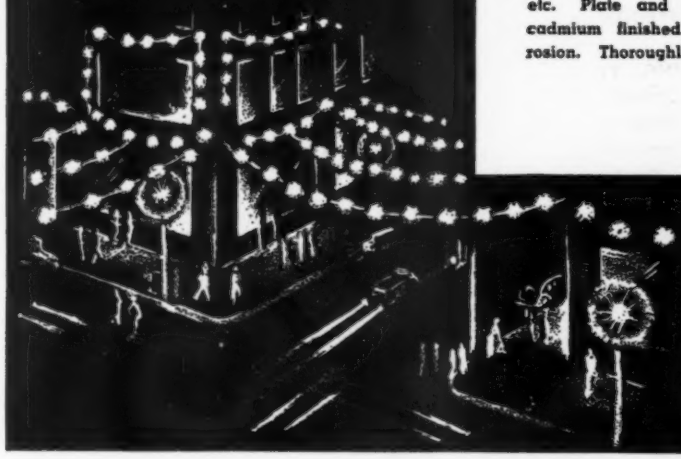




ECTRICAL
TRACTING
OCTOBER, 1937

Your Mustache Cup

IN MY HOME TOWN I knew an old man once who would not let the past begone. He lived with his son in a modern house, but he stuck to his kerosene lamp, his red flannel shirts, his honed razor. And he wouldn't give up his mustache cup.

ELECTRICAL CONTRACTORS, IN A WAY, are doing the same fool thing. For in this new world, where our besetting major problems are almost identical the country through, they are still trying to work alone. And so innumerable evils, that could be overcome by their united strength, bedevil them and suck their blood.

THE INDUSTRY WILL SOON MEET IN LOS ANGELES. A fine convention of earnest men will discuss the contractor's problems. Policies will be recast to deal with changing conditions. And NECA will go on with its intelligent, constructive work.

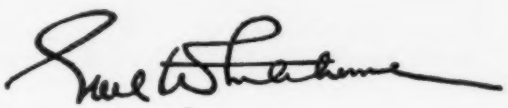
BUT LOOK BEYOND AND SEE A TRAGEDY! A few hundred at Los Angeles —fifteen—twenty thousand at home who don't even belong! They think they are not interested in industry affairs—not concerned with other men's problems. They don't need any help. That's because they don't see what is coming—what is already here!

IT IS TOO BAD THAT MODERN BUSINESS IS SO COMPLEX. But contracting is no longer just a matter of local competition. The real difficulties come from national influences—license laws, code changes, inspection, installment financing, R.E.A. rulings, co-op wiring, Federal power projects, power industry policies, economic conditions, labor relations—to name a few.

MOST CONTRACTORS DON'T WANT TO BOTHER about these things. "Leave me alone!" they say. God help 'em! They are alone! That's why they are in trouble.

BEFORE VERY LONG, THE TOUGHEST PROBLEM of every contractor will be labor relations. Labor will be organized in every town and the strength of your men will lie in unity. And the most vital work of our local, state and national associations will be—not fighting them—but guiding contractors in their labor policies and negotiations. What then—Lone Wolf?

THERE IS NO HIDING PLACE IN THIS NEW WORLD. And it is now about time electrical contractors made their choice. Which will it be for *you?* Organized cooperation or the mustache cup?



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OAKLAND WITHOUT FERRIES—*A chain of bridges touches island moorings in its 49,986 ft. winding course, and spans the bay to link San Francisco with Oakland for speedy crossings.*

Two Big Bridge Jobs

One Electrical Contractor Wired both the San Francisco-Oakland and the Golden Gate Structures and Here's the Story.

By William A. Cyr.
Pacific Coast Editor

TWO of the world's greatest bridges —in the same city—and wired by the same contractor—in two entirely different ways. Not once in a blue moon do you get a combination like this. Yet, Alta Electric and Mechanical Company, Inc., San Francisco electrical contractors, add this distinction to a long list of big jobs completed.

Big bridges, such as the San Francisco-Oakland Bay Bridge, and the Golden Gate Bridge, are rare. Yet, because big jobs are just a series of small jobs, some of the details of these two installations may be worthwhile to other contractors.

First, there are two separate and distinct bridges. The first to be finished, runs east and west from San Francisco on the peninsula, to Oakland on the mainland. The Golden Gate Bridge, completed last May, extends north from San Francisco across the mile-wide ocean entrance to San Francisco's 400 square mile harbor.

The San Francisco-Oakland Bridge is really a series of bridges, with two decks—a six lane passenger automobile highway above a truck highway and interurban railway. It begins at San Francisco with a causeway approach, continues to Yerba Buena Island and then passes through a double tunnel and out over a big cantilever bridge, a long causeway and a longer fill. Then comes an ingenious concrete structure which untangles and gathers the traffic going and coming in various directions. Bridge and approaches are 49,986 feet long.

Golden Gate Bridge, on the other hand, is a single suspension bridge, but it is far more important from a navigation standpoint. Likewise, this bridge takes off from a military reservation at each end. With these distinctions in mind reasons for the electrical differences will become apparent.

San Francisco-Oakland Bridge

To light the roadway of the San Francisco-Oakland Bridge for its total length of 13.7 miles, 10,000-lumen sodium vapor luminaires were used—922 of them—spaced 150 ft. apart at an average mounting height of 25 ft. They produce an average of 0.84 foot-candles intensity on the roadway. In addition there are 35 Mazda lighted luminaires at the toll plaza and at the terminals of the bridge. Distribution was provided from six substations fed from both ends of the bridge.

Work began with an underground crew laying conduit for the luminaires along the approaches to the bridge. Next a cable-splicing crew was organized to handle the 4-kv. bronze armored parkway cable used for the supervisory control and for power feed and interconnection between the various substations on the bridge. Next a station-wiring crew took over the substations. Finally, on the structure itself, another crew installed the luminaires, navigation lights and beacons.

Seasoned men had to be specially

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GOLDEN GATE—*Clearing 220 ft. above the entrance to San Francisco Harbor, this world's record suspension span of 4,200 feet, reaches to the rugged north coast. The bridge is 9217 ft. long.*

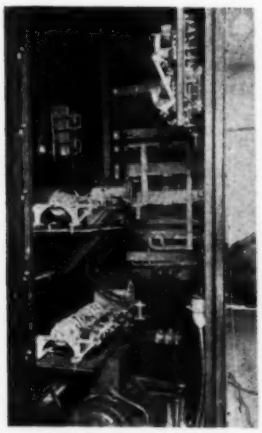
SODIUM DAYLIGHT—*Golden Gate's six-lane roadway reveals the effect of modern highway lighting methods using sodium vapor units mounted on curved-top steel standards.*

trained to work efficiently over the open water. They were started on work near the ground and gradually accustomed to increased elevations, before they went out on the high structures of either cantilever or suspension spans. Mechanics who drank were barred and those who would not use their safety equipment—hard hats, safety belts and lifejackets—were soon eliminated. As a result, only one accident occurred during the 67,000 hours of work by the electrical crew on this bridge and this accident was one over which the contractor had no control.

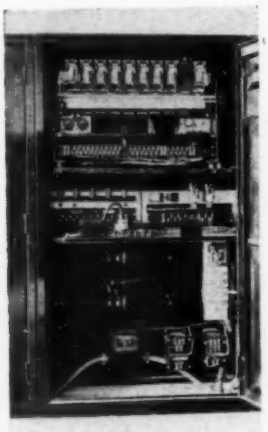
Since much of the work on the structure required welding, burning holes with acetylene torches and fabrication of hangers and clips to hold cables in place, the men were provided with a portable welding set. Several 1500-watt portable lighting generators furnished power for electric drills and temporary lighting. All this equipment was gas engine driven. Gasoline mantle lanterns were used when working inside the cells of the suspension towers, which are 500 ft. in height.

A four-wheel drive derrick and winch truck proved a most versatile tool. During the early part of the work it pulled the heavy cable, made up in 1500-ft. lengths, and some of it weighing 8 lb. to the foot. Only a limited tension was permitted because the cable was of wrapped bronze armor over jute filling.

Special split snatch-blocks were used in this pulling. The cable was stretched along the roadway and then lifted by these snatch-blocks and hung over the side on messenger cable on the outer chord of the bridge deck structure. The snatch-blocks were large enough to take the 166-conductor



HORN BLOWER — *Foghorn flasher controls for Golden Gate are behind a low tension cubicle, together with emergency equipment, and battery charging generator.*



FARE RECORDER—*For registering fare collections, and for counting traffic flow, this relay equipment for the Golden Gate bridge was placed in the administration building.*

LIGHTED STEEL—*The Oakland suspension span reveals its structural proportions under the rays of sodium highway lighting units spaced 150 ft. apart.*

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ERECTION CREW—*For setting the Golden Gate roadway standards, a truck boom permitted ground-assembled units to be handled with ease and without breakage hazard.*

TUNNEL ENTRANCE—*The Yerba Buena Island tunnel forms a part of the Oakland Bridge route. Here the system of lighting changes to ceiling-mounted units to provide maximum roadway clearances.*

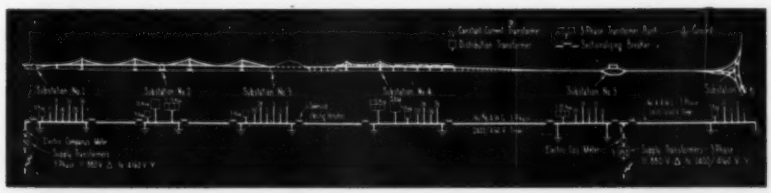
control cable and could also handle several of the smaller sizes, such as three No. 6 cables. The street lighting circuits were run in two individual No. 6 cables to stagger the lighting units. The 166-conductor cables ran from one end of the bridge to the other, terminating in the toll house administration building. A 4-kv. cable fed between each of the substations. At each of the expansion joints in the bridge, special clamps were devised for holding an expansion loop.

To speed up the crews they used four portable lift towers on wheels. They were moved by hand, starting at the top of the grade and working down, and the platform could be lowered or raised by hand winches. The luminaire standards were lifted in place by a winch and derrick mounted on a tower truck.

Tom Bennett, chief electrical estimator, supervised the job all the way through and did much of the organization and planning of the layout. Charles Lane was construction superintendent. "Our greatest problem," Bennett says, "was to adapt standard fittings to the unusual conditions and still make the job moisture and corrosion-proof." A number of packing glands were made up with soft lead packed in and around the interstices of the bronze armor. Instead of the usual lead wiped joint, a bronze pipe sleeve was used for all splicing. In splicing the 166-wire control cable the swirl of the wires in the original cables had to be carried through the splice. By staggering the connections, the size of the cable was not increased more than one-half inch over normal.

Another special design by the contractor was a terminal switch box of heavy gauge steel, hot dip galvanized, for use with the 166-conductor cables, wherever splices were made, on the structure, or taps were necessary to re-

PERMANENT CONNECTION—*A splicer working with 19- and 49-strand tellarium cable at a cast aluminum sidewalk pull box and expansion joint, near one of the Golden Gate bridge standards.*



STATION CONTROL—*Along the 13.7 mile Oakland structure are six substations, energized at either end by 11,880 V., 3-phase feeders. A sectionalized 2,400 - 4,150-V main feeder with a centralizing magnetic breaker provides energy from either side of San Francisco Bay.*

CONTROL CENTER—*All lighting circuits are controlled at this engraved micarta operating chart on the Oakland Bridge. Here H. A. Tilson, electrical engineer of the California Bay Bridge Authority, operates push button relays to various substations.*

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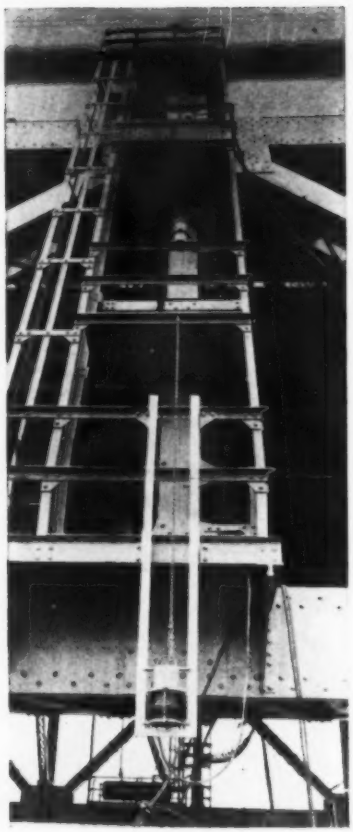
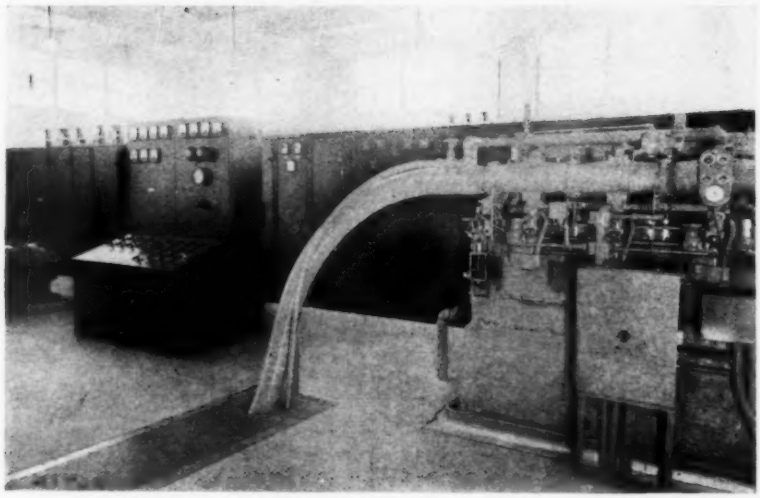


SAFE MAINTENANCE—*Navigation lights located mid-point of the Golden Gate span brought a dizzy installation problem. Note steel ladder, work platforms at lamp levels, and lowering chain for the bottom unit.*



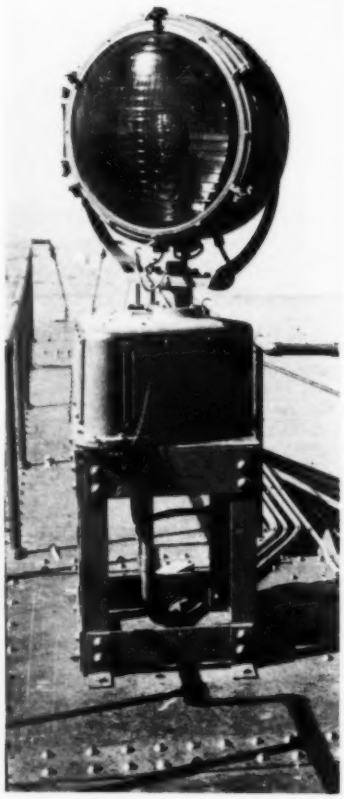
AUXILIARY POWER—*In emergencies, the Golden Gate Bridge system can fall back on its 187½ kw. generator, with 330 h.p. engine drive. Bench board and cubicles can be seen in the left background.*

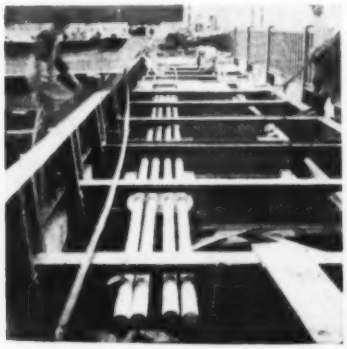
lays. Each box was equipped with many wing-nut bolts and a navy specification rubber gasket to clamp the cover tight for a moisture-proof job. Inside the terminal box, molded bakelite terminal strips were mounted. This control circuiting carried 94 volts d.c.

Several methods had to be developed for the installation of the series transformers used at each luminaire. Along the fill on the Oakland mole, they were housed in a concrete box adjacent to the base of the tubular steel standard. On the steel structure the transformer was mounted exposed on the steel column or on top of the steel chord. In the concrete of the approaches and traffic distribution viaduct, cast aluminum boxes were placed at the base of the standards and cast in the concrete for the transformer housing. In each case the cable was looped up from the transformer through conduit inside the standard. On the lower deck the transformers for the luminaires were hung in the channel of the 5-ft. beam just above the luminaire.

On the concrete traffic distribution structure at the Oakland approach, the single cable used in the series lighting system was run in copper tube, to avoid the magnetic effect of a single conductor in an iron conduit. More than 6,800 ft. of this copper tubing was used with the joints lap soldered. In the tunnel the series transformer was recessed in an aluminum box near the

EXPANSION METHODS—*The sidewalk slab conceals conduit runs that employ brass expansion joints located every 50 ft., for the Golden Gate Bridge lighting, supervisory and spare circuits.* (*Below*)





SKYWARD WARNING — *Oakland Bridge beacons were hoisted from the bridge deck with the contractor's truck winch.*

MASSED CONDUCTORS—*A 15-reel setup for pulling supervisory control wires into raceways in the Golden Gate sidewalks.*

TRAFFIC REGISTERS—*Intricate mechanisms to actuate toll booth indicators called for a maze of control wiring, as at this 16-lane Oakland Bridge toll entrance.*

LIGHTING TASK—*To provide safe roadways by day or night in rain or fog, the lighting system came first in electrical design details. Golden Gate's luminaries were mounted on split structural steel standards with graceful upper lines. (Below)*

roadway level set into the face of the tunnel.

Materials were delivered to the various parts of the construction. Eastern deliveries were made by boat and brought to the field office by truck. Rail deliveries came in on a special spur track, supplied by the interurban railway system running along the mole.

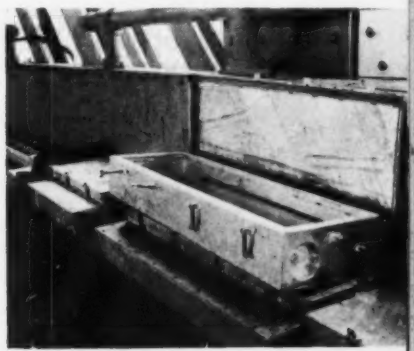
The other job started three years before any electrical work was done on the bridge itself. This was because both approaches to the Golden Gate Bridge traversed U. S. Army reservations and fortifications. Extensive alterations had to be made by the Army and a number of buildings were rebuilt. Then power machinery was installed for the bridge cable spinning and steel construction work. Finally Alta Electric sent a superintendent, C. E. Porath to start the job. Also because ships are constantly passing through the Golden Gate and because much fog rolls in from the Pacific and obscures visibility, one of the first functions of the contractor was to

[Continued on page 170]

SLEEVE MAKE-UP—*The 4-kv. Oakland Bridge lighting cables were spliced with minimum bulge, using a bronze sleeve and packing gland, and then compounded. Bronze flexible cable connections to conduit ends provided for expansion.*

TERMINAL HOUSINGS—*Hot galvanized gasketted enclosures were provided for groups of bakelite terminal strips. Heavy wing nuts made damp-proofing easy, despite occasional opening of boxes for future maintenance of the Oakland Bridge system.*

BRIDGE MARINES—*Helmeted soldiers of the dizzy heights used a truck to reduce the distances of Oakland Bridge.*



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CONTRACTING

DESERT WORK—*And here where men are men, pipe bending is done man fashion in the raw—or maybe half raw.*

A quick review of the construction work that makes the contractor's job in the Far West unlike that of his eastern brothers.

CONTRACTORS visiting the West Coast notice a difference in the kind of electrical construction being done there. These differences arise from unusual types of industry and utilization, and higher standards of construction than are common in some other sections.

Irrigated farming, fruit packing and processing, oil production and refining, and the movies loom large in far western contracting. Standards are higher because the country is newly built and uses a greater proportion of electricity than like homes and industries almost anywhere else. And being recently erected, the newer types of equipment are installed and there is less patching up of old installations.

Because much of the farm land in California is arid, water must be pumped onto the land. Extensive use of electric motor-driven pumps, is made in irrigation, both of the vertical direct-connected type and of the flat or V-belt driven horizontal type. And a generally mild climate permits many such installations to be made right out in the fields, without housings over either pump or control equipment.

Fruit packing, processing and cooperative marketing organizations, such as "Sunkist" and "Hood River", provide the contractor with large scale installation jobs when new packing plants are built. Jurisdiction over all places of employment by the Industrial Accident Commissions of these states brings wiring under their safety orders, even though the plant is located out in the farm country near the source of supply, outside of municipal ordinance zone.

All switch equipment is dead-front or of the safety switch type. Wiring must be in conduit or in some cases electric metallic tubing is permitted for lighting runs in the roof trusses. Safety overload and no-current devices and interlocked controls are often required. Portable tools must carry 3-wire polarity cords and lock or arc-proof connections, in most instances. Wineries and distilleries must install vapor proof equipment.

Low electric rates have made it economical for oil producing and refining companies to make extensive use of electricity for drilling, pumping and in operation of cracking and refining equipment. Some of this work is done by contractors for independent oil companies in the numerous oil fields of southern and central California. Motor service shops also do considerable business in the repair, rewinding and general servicing of electric motors and control equipment for this industry.

Good Oil Job

When the contractor does do a job for an oil company, it is a first-class high-grade vapor-proof construction, as a rule. One of the local oil companies, for example, duplicates its entire distribution system and equipment from service entrance to final utilization apparatus. Parallel distribution lines, parallel switching and control panels, circuit breakers, lightning arresters are common practice, because of the extreme importance of keeping continuity of service for fractionating stills, that break down the crude oil into gasoline products. Bonding of all metal about the premises, every pipe, every sheet-iron shed, every motor, every piece of apparatus to a common grounding system is usual with many oil companies.

Contractors come into the movie industry only as the installers of original plant. But there is big work in new studios and technical buildings such as the expensive film processing laboratories, the sound and recording laboratories, and the elaborate radio broadcasting studios which have recently moved to Hollywood because of the wealth of talent in that vicinity.

Originally, movie layouts were direct-current supply systems of extraordinary ampere capacity. This larger direct current supply usually was converted from a.c. by means of motor-generator sets in power houses located on the studio lot. The d.c. supply was used to feed the noisy flame arcs, the Cooper-Hewitt banks and other lighting apparatus. Advent of sound films brought with it the need for elimination even of the noise of the arc lights and hence for silent light sources. Incandescent lamps were then introduced and now alternating current systems can be used in studios with considerable economy.

The erection of main studio plants

[Continued on page 121]

1-2 FRUIT PACKING—*Olive inspection demands high intensity lighting, with daylight screens. Conveyors in this orange plant have interlocked limit switches. It all makes wiring.*

3 CUSTOMER NO. 1—*Homes are California's biggest industry—with Spanish architecture. This one is in San Clemente that boasts of more electric homes than any other city of its size.*

4-5 FARM IRRIGATION—*This work sizes all the way from small single fan pump motors to district irrigation and canal systems, like this one in the San Joaquin Valley.*

6 HOLLYWOOD—*This city of movie photography, sound recording and radio broadcasting is crammed with electrical applications and hair-trigger installation service.*

7 OIL PUMPING—*Outdoors in the desert, these explosion proof motors force oil through the pipe lines. This 100 hp. machine with its 75 hp. standby drive in the background are in Torrence, California.*

on the Coast

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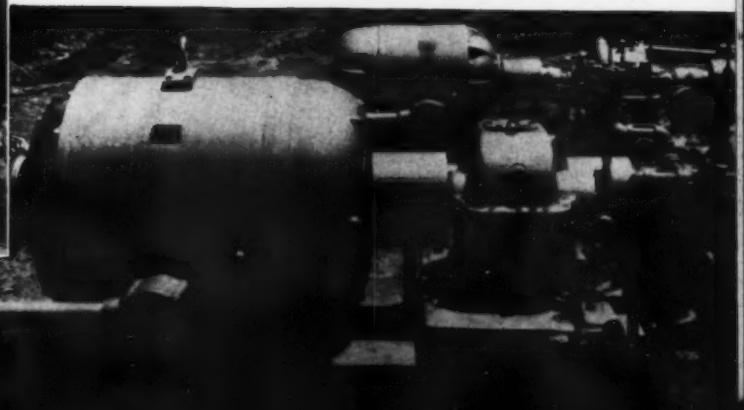

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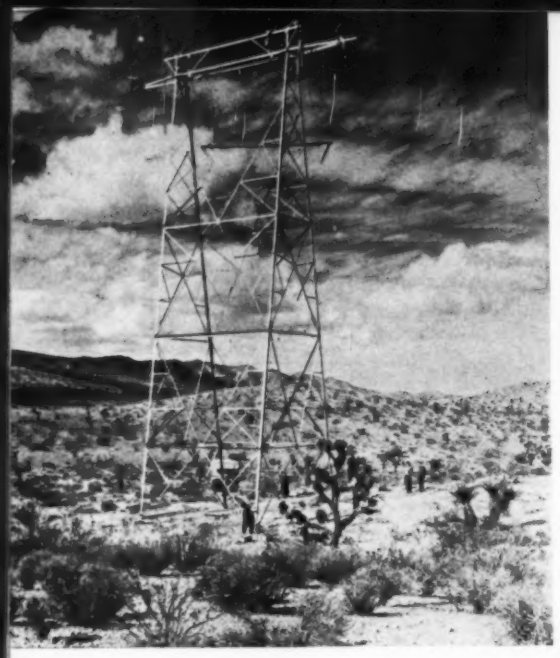


BOULDER DAM *power at 230 kv. is carried 237 miles for lifting water over western mountains. Fritz Ziebarth erected 940 of these towers in desert and mountain country.*

Desert Lines

SEVERAL far western electrical contractors are doing interesting work right now on high tension transmission lines. They are making speed and economy records under the most adverse of construction conditions, in America's toughest, hottest, hardest, most desolate region, the desert just west of the Colorado river.

Of late years the utilities have built their own lines. But when the Metropolitan Water District of Los Angeles started its mammoth project to drill 92 miles of tunnels, and build connecting aqueducts and works to lift and deliver water 392 miles away, power was a prime requisite to the construction and the electrical contractors were called in.

They were asked to bid on the building of 196 miles of 66 kv. main feeders of 4/0 copper conductor line on wood pole H-frame and wishbone structures; 299 miles of 33 kv. subfeeders with 2/0 cable, and 29 miles of No. 2 distribution lines on pin type insulators and wood poles. This was to supply a total of five 6,000 kva. main substations, and 83 distribution substations ranging in capacity from 20 to 2,000 kva. The bulk of this line construction was handled under several contracts, by H. H. Walker of Los Angeles, either with other contractors or on his own.

Experience gained on these lines served Walker well, for with Fritz Ziebarth of Long Beach, he landed the transmission line from Spokane to Fort Peck, Montana, to supply power for the

REELING CLEARANCES *were maintained by the tilted position of the reel carriages when hooked up in tandem for multiple payout.*

TOWER ERECTION *for Fort Peck's temporary lines was mechanized by H. H. Walker, a trailer derrick towed by a truck.*

TRANSMISSION CARAVAN—*Trucks and cars at Walker's Los Angeles headquarters, starting for the tough Fort Peck job in Montana.*

How handicaps were overcome by electrical contractors in building western transmission lines.

LINEMAN CAMPS *like Walker's in the Whipple Mountains provided good food and water, camp comfort, and sanitation.*

DESERT TANDEMS *under caterpillar power were utilized by Walker for mobility and efficient stringing of heavy stranded cables.*

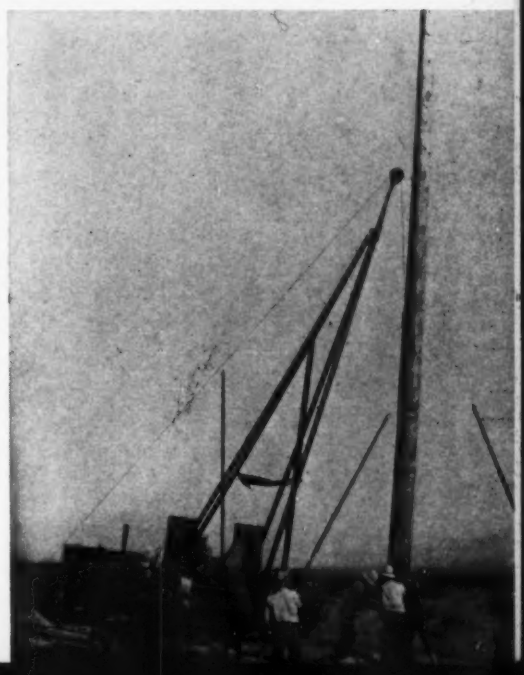
HAND PIKING *poles inaccessible to machines. Here the pole setting crew followed the gang that blasted holes out of solid rock.*

construction of that governmental project. Later he erected the line from Spokane to Mason City to furnish construction power to the Grand Coulee project. More recently his firm was awarded the contract to install the conduit systems in four of the five huge pumping plants of the Metropolitan Water District—the Gene, Eagle Mountain, Hayfield plants and the Intake plant near Parker dam. Conduit runs of steel and transite are being installed by this contractor between the receiving substation, the switching yard and the big pumping units themselves.

As a measure of the size of this equipment—the pump motors at the Intake plant are 9,000 hp., with a 294 ft. head, designed to deliver a uniform 200 sec. ft. At the Gene plant 9,000 hp. motors lift 309.9 ft. and at the Iron Mountain plant the lift is 145.5 ft., and motors are 4,300 hp. apiece. At Eagle Mountain, where the head is 440.5 ft. and at Hayfield, where the lift is 444.3 ft., 12,500 hp. motors are going. This makes a total head of 1634.3 ft.

Equally interesting is Walker's newest job, of building an underground transmission system in the Hawaiian Islands for the U. S. Army. Large pipe bends are being made for this job in his shop in Los Angeles, from the plans and specifications, and shipped direct to Hawaii ready for fabrication. Fritz Ziebarth has also chalked up another record, completing eight months ahead of schedule, the permanent steel tower transmission line from Boulder Dam to the two main substations of the Metropolitan Water District, a total of 237 miles of 230 kv. line.

FOR TOUGH SPOTS *this caterpillar truck, first equipped with a hole digger and later with a boom, could get almost everywhere to supplant hand erection methods.*



UMI

Pacific Coast States Have Forged Ahead With Legislative Protection For Electrical Contractors

These Laws Help Contractors

PACIFIC Coast States and the province of British Columbia are helping electrical contractors become better business men, and making it tough for the fly-by-night to prey on the public and the industry. The interesting thing is that the same ends are being sought by different methods.

Oregon, Washington and British Columbia have laws which bring wiring installation under rules and regulations similar to local ordinances. California has a law which requires proof of business ability, before a license can be obtained, and which revokes the licenses of those who injure their customers by any type of sharp practice.

The British Columbia law covers the installation and the use and sale of electrical equipment of any nature, even central station pole lines and industrial apparatus. It is administered by the Workmen's Compensation Board, and the act has jurisdiction over all local inspection departments. In fact a local ordinance only exists by virtue of the act, and must be based on regulations that "are not repugnant to the provisions of the act," to quote W. E. Leppard, chief provincial inspector. Local by-laws supplementing the code are only passed subject to the approval of the board. Any controversies between owner and contractor, or contractor and inspector are arbitrated through the provincial department. Appeal is only to the courts.

No fees are charged for inspections outside of cities having local inspection. Contractors are not licensed but are held strictly accountable. Inspections are made and, if hazardous conditions are not corrected, the compensation rates are raised until they are.

Washington does license contractors and requires a $1,000 bond. The fee is $50 a year, which supports the department, consisting of nine inspectors operating under the Department of Labor and Industry. Local inspection authority is delegated under the state law, which unifies local and state legislation. Because there are no fees for inspection, there is no expense to the property owner who gets electrical work done outside of city license boundaries.

Under the bond provision of the act, the contractor is required to give the public first class electrical work. This bond even protects anyone with whom he does business, including the wholesaler or material man. Thus it requires the contractor to be a better business man or forfeit his bond.

Sales Control Trend

The Washington law still lacks sales control over substandard appliances or materials, although an effort was made at the last legislature to incorporate this feature into the act. Likewise provision is being sought to refuse a home or plant owner permission to do his own work unless he qualifies to do so. Among the 550 licensed contractors in the state, there have been several licenses revoked for cause.

To recover his license, the contractor must make good the job which he has neglected or skimped, and must make his regular monthly affidavit report of jobs performed. Check up of such jobs is provided by power company reports on meter sets. Appeal of a state inspector's decision may be taken to a special appeal board.

Oregon, on the other hand, has sales control included in its law, but does not carry the provision for a bond for protection to suppliers or customer. It is broader in other respects, however, in that it makes the contractor responsible for his men, and requires four year apprenticeship and examination for journeymen. The annual contractors license fee of $20, and $3 journeyman's fee provide the only funds for support of the inspection department of three men, hardly enough to do complete inspection. There are no fees charged

[CONTINUED ON PAGE 121]

INSPIRATION—*This land of stately precipices, spires and domes, majestic water falls and towering trees does things to men. And so the Coast has often shown the way.*

Los Angeles— Let's Be Selfish!

A confidential word to electrical contractors who are not going to the NECA Convention. Others should not read it.

AN ELECTRICAL contractor dropped in on us the other day. He asked this question—

"Hey, how about this Los Angeles convention? Is it worth while going?"

He is an old friend. He was asking for advice. We had to tell him.

"Well, let's be selfish," we said. "Let's be hard boiled about it. After all, it's just another little business problem. We'll analyze it. First let's take the reasons why you shouldn't go. There are four of them—

1. If you know all there is about this business—

2. If you can't get any new ideas from other contractors—

3. If you've been to the Coast and don't like it—

4. If you are not interested in having a good time—

"Then by all means—Don't Go! But, if by any chance, you would like to broaden your experience and sharpen your wits, so you can make more money in your business—and if you are not too old to enjoy a trip like this—well, then that's different!

"For men like this, who are still learning and going ahead, there are eight reasons why going to Los Angeles to this NECA Convention will be good business and good fun—

1. The program will present an intelligent discussion of many of the most important problems that confront you in your town today.

2. You can meet the fifteen men who will address these meetings and put your questions up to them.

3. There is an opportunity here to gather counsel that would require 5,000 miles of travel—if you sought them out—from men who would be too busy to advise you at any other time.

4. You will make many new friends to whom you can write in future, when you want opinion and experience.

5. You will visit contractors' offices and stores and motor shops, and see examples of different construction and new methods that will broaden your knowledge, bring new saleable ideas.

6. You will see the great Federal Power Developments, that are going to play a large part in electrical affairs in the years ahead, and know something about them.

7. You will get acquainted — or re-acquainted with a country that is so progressive and alert that the mere contact will wake you up and stimulate your business when you return.

8. Also, you will have a grand vacation—in the most interesting, spectacular, beautiful and enjoyable country you will ever see.

"Yes, Bill," we said, "take it all in all, this convention is worth while. You better be selfish and go."

Are You Concerned With—

1. **Getting More Business?**
2. **Better Wiring Standards?**
3. **Power Company Influence?**
4. **Industrial Modernization?**
5. **Apprentice Training?**
6. **Competitors?**
7. **License Laws?**
8. **Repair Shop Problems?**
9. **Wholesaler Influence?**
10. **Fair Trade Policies?**

—Well! So is the Convention!

INSPIRATION—*No man ever leaves this country behind. Memories stay with him that he never ceases to enjoy.*

"But, I'm not a member of NECA!"

"Well you ought to be ashamed of yourself. But you can go anyway. You're specially invited."

"But it costs so much money," he protested, "and takes so much time!"

"Hell! Bill!" we said. "If you can't make money out of this convention you're a plain damn fool. This convention will not be an expense to any man who goes for business purposes. It will be a smart investment."

Bill grunted.

"And as for time," we continued, "how much cash money will you make with your own time, while you are staying home? And how much of your life are you supposed to use for yourself? Take the trip and get some fun out of it—along with the profit. Boy! When you're dead, you're dead all over."

"For God's sake! Shut up!" said Bill, reaching for his hat. "You'll have me taking the family, next."

UMI

STONE'S STORE—*At 835 South Olive Street. His office and shop are in the rear*

Looking in on A

ALBERT L. STONE—*Host to the Los Angeles Convention*

Fifth in a Series of Informal Visits to Interesting Contractors

By Earl Whitehorne

BACK in 1898 your Uncle Samuel got mad one day and started fighting. Of course, it wasn't a Class A, major league affair. It lacked the social standing of gas masks, flame throwers, submarines, bombing from the air and the other modern improvements. But at that, it started in Havana and wound up in Sulu, which is a fair stretch for any fight.

Well, one night down in Sulu, one of our favorite electrical contractors was sitting in his tent. He was a sargeant in the Signal Corps. They told him that a message was coming from the north and out he popped with his night glass. Fingers of light were flashing in the sky, a semaphore dispatch from Manila. It told him that Funston had captured Aguinaldo.

Now, the American Army had been chasing young Agunialdo round the jungle for a couple of years, and like Paddy's flea, every time they put their finger on him, he wasn't there. And every time they thought they had him hiding in Mindanao, he and his gang of insurrectos snuck up behind them down Sulu way or somewhere else and carved up a company with bolos or maybe, trimmed their ears like a fox terrier. Altogether Aguinaldo had become such bad news that smart Yankee soldiers didn't lay down nights without looking under the cot.

Sargeant A. L. Stone took his dispatch, as he was ordered, and called on William Howard Taft, then president of the Philippine Civil Commission and that night right in Sulu, trying to set up a peaceful government, when Aguinaldo wasn't looking. About sixteen aids wanted to take the message but Stone wouldn't talk. So Big Bill Taft rolled out of bed and came down in his old fashioned night shirt—like a circus tent—and the war was over!

And that's the A. L. Stone we're all going to visit this month out in Los Angeles. For he is NECA executive committeeman from California, Nevada, and Arizona, and host to this year's national convention. Let's see what kind of a contractor he is.

It all began in Greenview, Illinois, where A. L. was born, son of a village blacksmith. And that's a good American beginning. He left the grammar school at twelve years old and went to work in a coal mine, as a helper, and at fifteen was a full fledged miner, drilling and blasting on his own. But in 1894, there was an accident and he quit and got a job with the Chicago and Alton Railroad putting out switch lights, cleaning gravity batteries for the telegraph and working round the station. He learned to operate a telegraph key and became an assistant operator. And then his parents moved to Southern California, like so many Illinois folk, and A. L. went along.

He was working in a beet sugar factory in Chino, Cal., when President McKinley called for 250,000 volunteers to fight the Spaniards. Stone enlisted, April 1898, and served three years and seven months, most of the time in the Philippines. His telegraphy got him in the Signal Corps and they brought him home round the world and mustered him out at Plattsburgh, up on Lake Champlain. He went back west—it was now 1902—and into the Los Angeles Traction Company.

Next year he shifted to the Home Telephone Company. They were building a new telephone system and Stone was an installer for two and a half years and then wire chief in the first automatic telephone office in Los Angeles. In 1908, he became switchboard man for the United States Long Distance Telephone and Telegraph Company and in 1919, had risen to be their superintendent of plant equipment. That year he quit and went in business for himself—enter the Stone Electric Supply Company.

We find him now at 835 South Olive Street, in downtown Los Angeles, with a store selling appliances, lamps and supplies—at retail—not wholesale as the company name might indicate. But he is principally engaged in commercial and industrial wiring. He began on residence and apartment work, but shifted over, because he had an idea.

A. L. STONE

And it is that idea that makes the story of A. L. Stone interesting.

The Simmons Hardware Co. of St. Louis, Mo., used to advertise a slogan about that time—*"The quality of our goods remains long after the price is forgotten."* It started Stone thinking—and he organized his business around that thought. He decided not to compete for jobs but to make his work do his selling for him and build up a set of responsible, permanent customers, who are willing to pay a fair price. He was determined to furnish the best quality of materials and workmanship on every job and to send a bill in keeping with that kind of service. And to dramatize the idea a bit, he framed a photostat of the certificate of inspection issued by the city, on each job, and hung it on the customer's wall.

As a result, almost none of his business is competitive and it is all "sold-up" in a very sound way. He and his men make an extra effort to turn out good looking and self-advertising jobs. And so, he lighted up a parking lot a while ago and that installation won him the future work on a whole chain of lots—uncontested—and now this is one of his good accounts. He has the patience to plant ideas and build confidence. For three years, he kept telling the local office of Dun and Bradstreet that a really adequate lighting system would increase their operating efficiency. Finally came an order for 65 indirect units of 500 watts, with new switchboard, feeders and metal moulding, concealed in soundproof ceiling.

Stone follows through. He has made a hobby of accounting, of studying buying trends and taking advantage of them. He watches the markets, buys with care and foresight. He says a contractor who does this, saves extra profit, to which he is fully entitled. His advertising, too, is carefully planned. He regularly spends one half of the cost of rent on advertising of a personal, friendly character. He found that neighboring department and drug stores sell lots of lamps but carry no special types or sizes. Stone specializes in them and customers are referred to him and out of these contacts comes other business. But his main activity is wiring—service, maintenance, alterations, repairs, extensions and remodelling—for good customers—plus the frequent big installations that come to him without price cutting.

Stone has a regular organization of five men and two women, aside from the wiring crews. When the hard times hit him, he called them all in and told them that their jobs were secure as long as his resources lasted—with one condition. No one was to use the word "depression" or discuss the prevailing economic fears with any customer, except to say—"Our business is good." It worked. His people were confident and optimistic and they actually expanded during the acute period of the depres— I mean, the business cycle. When the curve started up, Stone bought a new home. The man keeps his feet on terra-cotta.

It is because of this that Stone is a leader in the electrical industry in California. He is president of the Los Angeles branch of NECA, as well as national committee man, vice president of the Pacific Coast Electrical Association, member of the Board of Directors of the Electrical Development League of Southern California, a member of the Los Angeles Electric Club and the Rotary. In industry meetings he has a firm, determined, yet quiet way of insisting that the contractor's place in the picture be respected, which is singularly effective. As a result, the contractor has fared better in cooperative work on the coast than in many other regions, where a more belligerent attitude has been taken. Stone has made the Electrical Industry Promotion Plan a real success in California.

Stone says a highlight in his career was the day when Cy Geishbush got him interested in the National Electrical Contractors Association. He has used the services of the association consistently and intelligently and urges every other contractor to affiliate with his national and local organization, if he would keep abreast of the rapid changes in the industry. Also, he believes that every man owes his industry a portion of his time to help improve conditions, since any act of any member affects every other member to some degree. He believes in a strong united industry, in which men work for common progress.

But A. L. Stone doesn't just believe these things. He lives them. He is making a fine contribution to electrical progress. He's worth a visit.

GOOD WORK—*This lighting was three years in the selling to Dun and Bradstreet—but it remains a permanent endorsement of the man who installed it*

Some men are skittish about bankers. They stay away when they should be using the bank as a matter of convenience. It is easy, if you are financially healthy. Here's how to go about it.

You a W

By
J. A. Livingston
Economist, Business Week

IT'S still a buyers' market for money. Which is just another way of saying that banks are anxious to lend. And why shouldn't they be? Their excess reserves, are at near-record totals, even after the Federal Reserve's boost in requirements. Never in the history of American banking prior to 1933, have American banks had as much idle cash on hand. Therefore, businessmen who want to borrow are as welcome to a banker as a plate of ice cream to a high school girl.

But bankers aren't interested in throwing their money away. Every Tom, Dick and Harry cannot get a loan. Bankers have their standards. Yet, any businessman, who has a good looking balance sheet and a record of consistent earnings need not tremble at the thought of going into a bank, climbing one or two steps to the dais where the loan officer sits, and asking for credit. That's what the bank's in business for—to extend credit.

Like a contractor

When a man is building a new house and wants it wired, he does not telephone the electrical contractor and plead: "I have a wiring job to be done, and I wonder if you would be so kind as to look over the premises, and I'd be very much obliged." He says: "Look, I have this wiring job; I'd like it finished in three weeks, and if you can come over and submit a bid, I'll consider it." The man who wants his house wired knows that there is competition, and that if you don't want the job, somebody else will. That's true, even in these days, when there's a shortage of skilled help and most contractors are up to their ears in work.

The banker is in pretty much the same fix. Just as the electrician has skill and labor and materials to sell, so the banker has money to sell (or lend). And just as the electrical contractor will succeed or fail, depending on the number of contracts he gets, so the banker will earn money or lose money depending on the amount of credit he extends. Consequently, there is no need to think that the banker is doing a favor when he grants a loan. To him it's just part of his business, and he should be—and will be—thankful for every opportunity to do business.

There's one strange, psychological twist about borrowing from a banker. Remember he's a human being. And the best time to tackle him is when you don't need money. That doesn't mean that a businessman should borrow when he cannot use funds; but it does mean that a businessman should consult his banker long before—say two or three weeks or months—before he wants an actual advance of funds.

That is known as establishing a line of credit. It indicates to the banker that the prospective borrower "has his eye on the ball," that he is looking ahead. More than that, it clearly demonstrates that the businessman is not after a "rush" loan. Also, the banker has plenty of opportunity to investigate. No hasty, curbstone decision is required. And as most businessmen know, bankers like to take their time.

The orthodox approach is to see the banker forearmed with necessary facts about one's business; and the businessman as a rule should ask for a line of credit substantially in excess of probable requirements. Say a firm expects to need $8,000 at the peak of seasonal requirements; well, then, it might seek a line of credit up to $10,000—just in case there are unseen vicissitudes. It is always better to underborrow a line of credit, than to try to get a line of credit increased after a set amount has been established in the banker's mind. The banker hates to think that he is encouraging a businessman toward overextension.

A line of credit may be described as

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oanker
Would Like to Meet You

a more or less informal understanding with a bank, whereby the bank agrees to make loans to a customer up to a certain limit. At the time the line of credit is granted, it is not known exactly when the customer will want the money. So a stipulated amount is put at the businessman's disposal, and the prospective borrower can count on getting the money, if his financial condition takes no sudden turn for the worse.

But the bank makes no firm commitment. The line of credit simply establishes an expectancy, and the requirements of the bank must be met when actual funds are to be advanced. The three principal reasons for setting up a line of credit are: (1) to meet seasonal payroll or inventory demands; (2) to increase advances to one's own customers; (3) to install new equipment, which the businessman expects to pay for over a relatively short period.

To get a line of credit, a balance sheet and an income account must be submitted to a bank. A statement certified by a reliable public account is preferred by most banking institutions, but is not absolutely necessary—particularly where the borrower is well known in the community and has a recognized reputation for honesty and accuracy.

But one thing that makes a banker uneasy is a nervous, anxious borrower, or prospect. If the businessman cannot answer questions promptly, naturally the banker wonders whether he knows his business as he ought to know it. Hence, it is well for the man who wants to establish a line of credit or to make a loan, to learn beforehand what the banker is apt to ask him. Then he can reply deliberately and pointedly, without having to leave too many blank spaces. Nothing breaks down confidence so much as having to say, over and over again, "I can't answer that off hand, I'll have to look it up." Nor is there any reason for having to be indefinite. The questions are fairly simple, if only the prospect is prepared for them.

What Bankers Ask

Here are some of the things a bank wants to know:

(1) Type of business—whether a sole proprietorship, partnership or corporation, and the names of the principal owners;

(2) Kind of business—whether a manufacturing, trading, mining, or professional enterprise, and the type of products or services dealt in;

(3) Balance sheets and income accounts for several years;

(4) Average inventories carried, and how they are valued, whether at cost or market. Incidentally, banks, uniformly prefer writing down inventories to cost or market, whichever is lower. It squeezes out any false overvaluation from the balance sheet.

(5) A schedule of investments and other assets not directly a part of the business. This would be an amplification of the balance sheet;

(6) A full explanation of any unusual balance sheet item, such as advances to business associates;

(7) An indication of the season of the year when the customer's debts of all kinds, including loans and merchandise accounts payable, are apt to be highest;

(8) State of taxes on property if owned, and the amount of all insurance carried, including insurance on the lives of officers;

(9) Methods of depreciation of plant and equipment;

(10) Indication of overhead expenses, covering rents, taxes, operation of trucks and so on;

(11) A statement regarding probable capital expansion, such as purchases of new machinery, or automobiles, or the acquisition of a new building;

(12) Other business interests of the principal owners and operators;

(13) An analysis of all contingent liabilities, including paper discounted with finance companies;

(14) Contracts and commitments to purchase materials and supplies;

(15) An estimate of business prospects over the near future;

(16) A general review of the type of customers to whom the borrower sells.

[Continued on page 75]

UMI

INDUSTRIAL HEADACHES—*Large motor repair jobs come in from Vermont's industries to this shop, because good will is fostered through free surveys and inspections.*

Opening

A Vermont Motor Service organization demonstrates what it takes to get along with industrial customers

By Ashland B. Taylor

President Burlington Electric Motor Service Inc., Winooski, Vt.

A FEW simple rules religiously followed and intelligently applied have brought success to the Burlington Electric Motor Service, Inc. of Winooski, Vt. as specialists of industrial wiring and motor service work. This company makes free inspections of electrical equipment, wiring surveys, detailed reports of all its findings, and written guarantees of all its workmanship.

The industrial wiring survey is more than a "door opener" for getting wiring contracts. It is the safe road to more satisfactory business and, if consistently followed and persistenly used, will lift the contractor, or motor repair man to his rightful place in the estimation of the prospective customer. So for the past three years, our company has made inspections of all the electrical equipment in any plant and has rendered a careful report of the actual conditions.

In the beginning, we specialized in the rewinding, repairing and redesigning of motors and generators. But, as a result of the inspection service, intended for motors only, we were called upon to inspect the wiring, and along with load tests, make "Megger" tests and determine correct wire sizes, switch and fuse capacity and the proper layout of the industrial wiring system. We soon learned that our report forms were not complete. We corrected them to meet the demand, but when the Anaconda "Industrial Wiring Survey" and "Industrial Guide" were brought to our attention, we realized here was an important contribution.

Through the use of "Industrial Wiring Survey", we not alone found many violations, but also materials that were being used without regard for the conditions surrounding the installation. Carefully checking, we also learned that no one firm specialized in industrial power and light wiring throughout our section of the country. Consequently, we organized a wiring department and put a man to work getting permission to make complete plant surveys with a view to rewiring and correcting any bad conditions found.

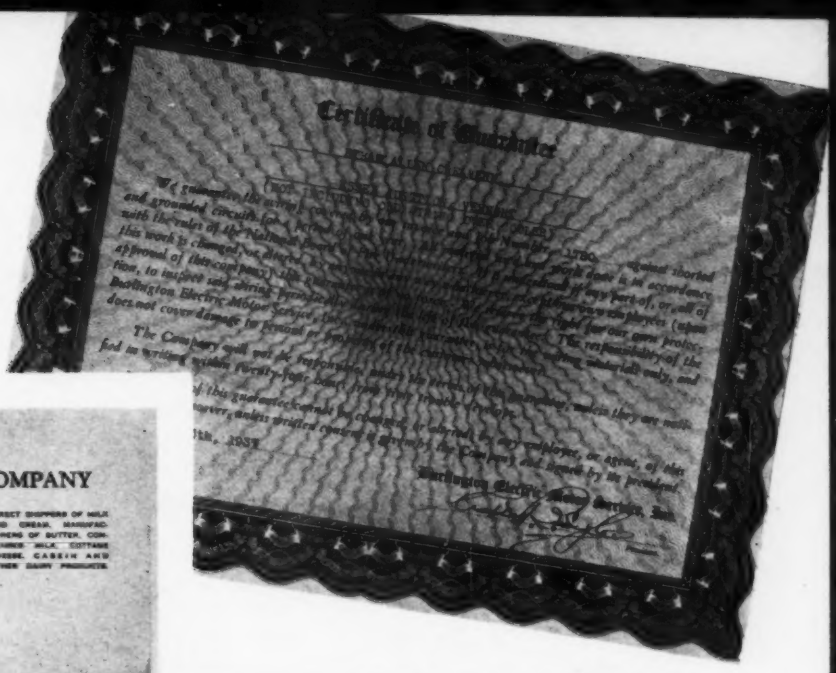
It soon developed that most of the better class industrials are desirous of correcting power factor and eliminating fire hazards. And on many of our rewiring jobs, we have effected savings in power and light bills as high as $150.00 a month.

For more than a year now, we have operated a wiring department, very successfully. Our efforts are confined to industrial wiring and all of our work is done on a time and material basis. Each job is sold on quality of material and workmanship. We give our prospective customer an estimate, but our price is open—governed entirely by quality of material and the amount of work required. All the work must be done within the Code, and unless we are permitted to use the best of material, according to our judgment, we will not do the work.

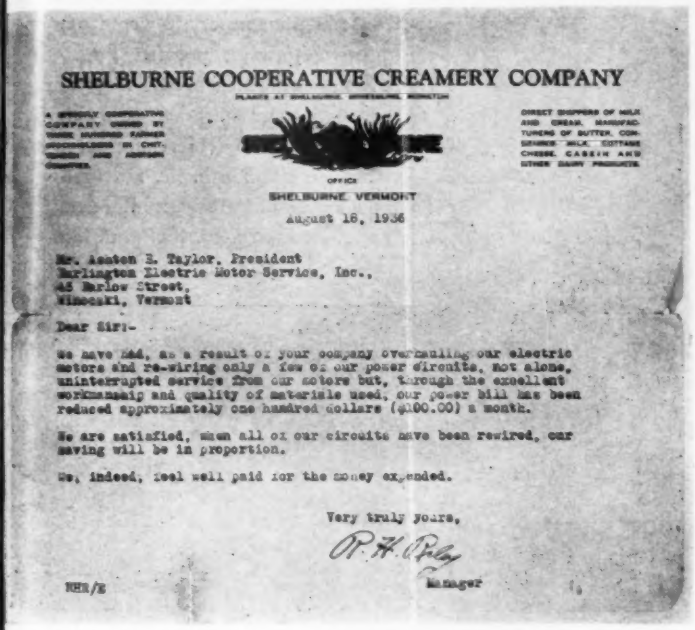
With each completed job, we issue a certificate of guarantee for a period of one year, covering the work done. Certificates of guarantee are also is-

BEHIND THE CERTIFICATE—*This shop crew is kept busy with quality jobs as a result of close relationships with many plants.*

the Factory Door


Certificate of Guarantee

WIRING GUARANTEE—*Customers receive a certificate guaranteeing the wiring system for one year against shorted and grounded circuits, and assuring the use of approved methods. A similar guarantee goes with completely rewound motors.*


SHELBURNE COOPERATIVE CREAMERY COMPANY

SHELBURNE, VERMONT

August 18, 1936

Mr. Asaton E. Taylor, President
Burlington Electric Motor Service, Inc.,
46 Barlow Street,
Winooski, Vermont

Dear Sir:-

We have had, as a result of your company overhauling our electric motors and re-wiring only a few of our power circuits, not alone, uninterrupted service from our motors but, through the excellent workmanship and quality of materials used, our power bill has been reduced approximately one hundred dollars ($100.00) a month.

We are satisfied, when all of our circuits have been rewired, our saving will be in proportion.

We, indeed, feel well paid for the money expended.

Very truly yours,

P. H. Riley

Manager

RHR/E

TESTIMONY—*This much worn letter shows where modernization brought savings of $100 per month to a surveyed plant.*

SELLING SKILL—*Customers receive a complete service in apparatus repairs or wiring backed by a policy that promotes employee responsibility for all its production.*

sued for each completely rewound motor. Therefore, for our own protection, as well as the customer's, we must insist upon the best. We have recently signed a 52-week contract with radio station WDEV, Waterbury, Vermont, for daily broadcasts, which we believe will give us a beneficial form of advertising.

What Taylor Gleans From Free Inspections

1. Condition and type of service
2. Detailed report and sketch of service
3. Present load on main switch
4. Report of plant wiring and insulation tests
5. Sketch of circuits, size and kind of wire used, number of motors or lights connected to each circuit
6. Type of fuses
7. Type of panel boards
8. Atmospheric conditions in each department or room
9. Type of wiring in each room or department
10. Average height and types of reflectors throughout plant
11. Kind of work in each room or department
12. Load tests on each motor on separate inspection forms

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Know Your Code—II

By John M. Turnbull,
Service Engineer, United Electric Light Company, Springfield, Mass.

The rearranged Code provides a logical sequence of rules that is easy to follow for wiring design, installation and application of equipment.

TO use the new Code to best advantage it is first necessary to understand clearly how it is organized for work. Its rearrangement was based on a logical sequence of subject matter which the contractor and inspector will find easy to follow once the ten chapters and their respective articles are studied as a whole.

To locate a 1937 Code rule readily one must first determine the nature of the question in mind—whether it has to do with system design, installation of wiring material, or the application of equipment to the system. An accompanying diagram indicates the priority of the general rules and definitions of Chapter 1, and how they apply to both design and installation methods. Since systems must be designed to comply with certain fundamental requirements, regardless of the types of equipment to be applied thereto, the chart again shows how the design Chapter 2 logically precedes the wiring installation rules of Chapter 3. Likewise Chapter 4, which deals with general equipment attached to the wiring system, takes priority over Chapters 5, 6, 7 and 8 dealing with rules of a more special nature.

For instance, Articles 6, 8, 9 and 20 of the 1935 Code have been broken up and then carefully fitted into the new arrangement of chapters where their former sections are now more readily recognizable. To use the Code easily now all depends on knowing the kind of information desired. Then because tables, diagrams and examples of calculation may apply to several phases of Code usage, these have been placed in Chaper 9, and the construction specifications have been collected in Chapter 10.

Two examples of the formation of the new rules are given in connection with accompanying diagrams. Some of the common problems of system design were chosen as examples in one case, while the subject of overcurrent protection was selected in another. It shows how closely related subjects have been collected into one article for quick review or application.

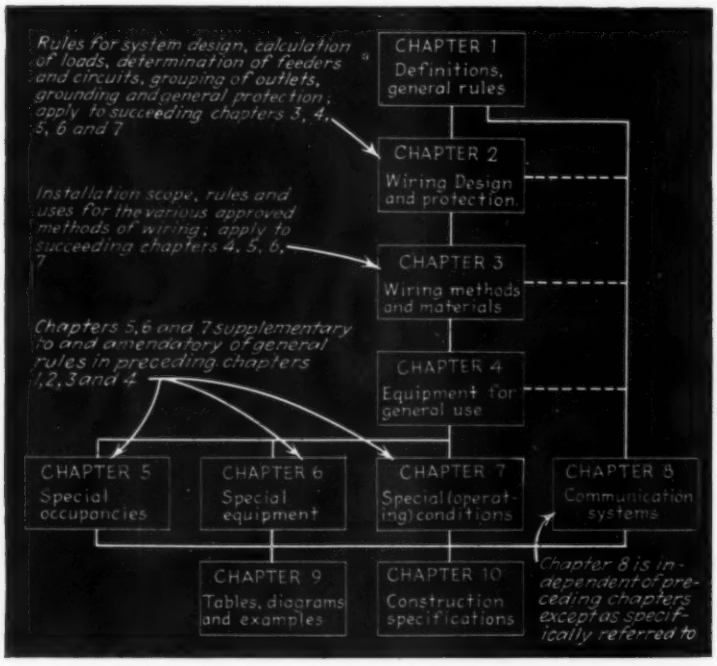
Although detailed cross references of the various 1935 and 1937 Code sections will be available, those seeking specific information must first find their exact place in the 1935 Code before such a cross reference will be of any assistance. Therefore, those who will have occasion to make frequent use of the new Code will save time by familiarizing themselves in the very beginning with its principles of arrangement.

No attempt can here be made to discuss the Code sections in detail, or to completely cover the 1937 changes. It is more essential at this time to point out the major topics, and how they relate themselves in succession to other steps in setting up requirements for a complete electrical installation.

JUST IN CASE—

The prime objective in publishing this series of articles on the new features of the 1937 National Electrical Code was to provide contractors and inspectors with a guide to the sweeping rearrangement it embodies. To provide this guidance *while the Code was new* it has been necessary to work from approved printers' proofs. Should any unexpected last minute changes be made and introduce any inaccuracies in any references here, it will be clarified in the next and final article of the series. Readers are invited to offer criticism of the new Code and their suggestions.

HOW THE CODE WORKS


Rules for system design, calculation of loads, determination of feeders and circuits, grouping of outlets, grounding and general protection; apply to succeeding chapters 3, 4, 5, 6 and 7
CHAPTER 1
Definitions, general rules
CHAPTER 2
Wiring Design and protection
Installation scope, rules and uses for the various approved methods of wiring; apply to succeeding chapters 4, 5, 6, 7
CHAPTER 3
Wiring methods and materials
Chapters 5, 6 and 7 supplementary to and amendatory of general rules in preceding chapters 1, 2, 3 and 4
CHAPTER 4
Equipment for general use
CHAPTER 5
Special occupancies
CHAPTER 6
Special equipment
CHAPTER 7
Special (operating) conditions
CHAPTER 8
Communication systems
CHAPTER 9
Tables, diagrams and examples
CHAPTER 10
Construction specifications
Chapter 8 is independent of preceding chapters except as specifically referred to

Designing the Wiring System

NEW ARRANGEMENT OF SUBJECTS

Chapter 1.

GENERAL

Definitions ..... Art. 100
General Statements ..... Art. 110

Chapter 2.

WIRING DESIGN AND PROTECTION

Polarity Identification ..... Art. 200
Branch Circuits ..... Art. 210
Feeders ..... Art. 220
Services ..... Art. 230
Overcurrent Protection ..... Art. 240
Grounding ..... Art. 250
Lightning Arresters ..... Art. 280

Chapter 3.

WIRING METHODS AND MATERIALS

General Requirements ..... Art. 304
Rules for Specific Methods ..... Art. 320 to 360
Outlets, Boxes, Fittings, Cabinets ..... Art. 370
Auxiliary Gutters ..... Art. 374
Switches ..... Art. 380
Switchboards and Panelboards ..... Art. 384

Chapter 4.

EQUIPMENT FOR GENERAL USE

Flexible Cords ..... Art. 400
Fixtures, Lampholders, Receptacles, etc. ..... Art. 410
Appliances ..... Art. 422
Motors and Controllers ..... Art. 430
Generators ..... Art. 445
Transformers and Transformer Vaults ..... Art. 450
Capacitors, Resistors and Reactors, Storage Batteries ..... Art. 460, 470, 480

Chapter 5.

SPECIAL OCCUPANCIES

Hazardous Locations ..... Art. 500
Garages ..... Art. 510
Theatres, Motion Picture Studios and Projectors ..... Art. 520, 530, 540

Chapter 6.

SPECIAL EQUIPMENT

Signs and Outline Lighting ..... Art. 600
Cranes and Hoists ..... Art. 610
Elevators ..... Art. 620
Sound Recording and Similar Equipment ..... Art. 640
Organs ..... Art. 650
X-Ray and High-Frequency Equipment ..... Art. 660

Chapter 7.

SPECIAL CONDITIONS

overing Emergency Lighting; Circuits and Equipment over 600 Volts and Less than 50 Volts, and Outside Wiring

Chapter 8.

COMMUNICATION SYSTEMS

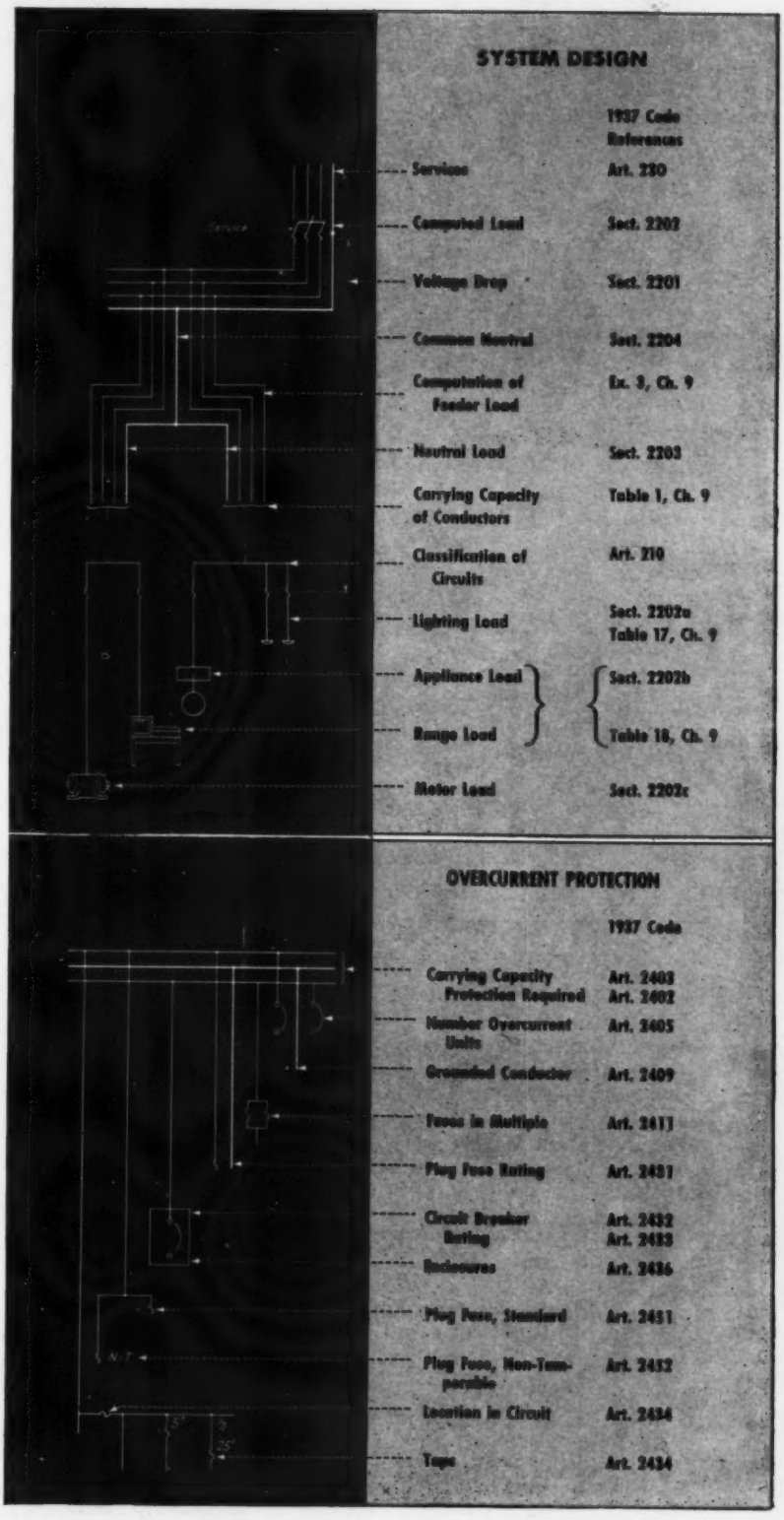
Signal Systems ..... Art. 800
Radio Equipment ..... Art. 810

Chapter 9.

TABLES, DIAGRAMS AND EXAMPLES

Chapter 10.

CONSTRUCTION SPECIFICATIONS



UMI

EVERY COMMUNITY *has many small jobs that can be done more efficiently if skilled crews are prepared for the day's needs. This truck has space for wire and pipe tools and ladders on top, spacious material bins are built in on both sides with locked doors covering them.*

SERVICE MATERIALS, *fittings and small tools are kept in this section, with outdoor meter boxes in the upper row. A locked door covers 22 bins, each with nameplate.*

ORGANIZE FOR

Small Orders

House Wiring Customers Want Good Work but will not pay for Big-job Methods

OUT in Detroit the contractors make service and meter modernization installations for the power company on a large scale. In 1936, about 125,000 jobs were done, for which the contractors were paid something like $1,000,000. They are organized on an efficient small job basis. As a result, the public gets the services of highly skilled mechanics at a fair price to all parties concerned.

The pictures show a typical traveling stock and shop, used for several years by a Detroit contractor on house-to-house service and meter alteration work. The idea is not presented as new. Every practical contractor recognizes this as a typical shop-on-wheels. Many may think of improvements they would have on their own outfit. But not enough such shops-on-wheels are yet in service.

Small jobs in scattered sections of every city require quick action, reduced traveling time, and complete mobile stocks to last a crew several days in succession. Prevailing wages cannot be charged to home customers for running errands to wholesale houses. Small, inexpensive materials must be at hand to serve every reasonable need of neighborhood crews. This is vital in suburban and rural operations.

Contracting for small jobs is considered unprofitable by most contractors. This is generally explained on the grounds of too much detail being involved, such as running for material, lost in-between-jobs time, piecemeal stock keeping and billing. Mobile supplies, tools and crews offer one answer.

FITTINGS GALORE *for various conditions save costly trips to the shop or wholesale house. It stops small-change delivery.*

THE COMPLETE HOME WIRING JOB ON A SILVER PLATTER

Adapted to every kind of residence. Installed, from service to the last receptacle, with materials from one manufacturer — General Electric.

Assures every home owner of a wiring system adequate for present needs, and flexible enough to accommodate future needs.

And easy to sell over skimpy, inadequate systems, because every new home builder is familiar with the quality and integrity behind the G-E symbol. Everyone has seen it — thousands of times — on national and local advertising. Put it to work today — to build up your wiring volume and your reputation as a modern, progressive contractor.

ULL COMFORT FOR THE CUSTOMER

FULL PROFIT FOR THE CONTRACTOR

GE LEADS THE WAY TO BETTER HOME WIRING

UMI

HERE ARE THE SECRETS F

You read this editorial in August Electrical Contracting

OLD
No. 1 Our

By Earl Whitehorne

OUT in India, the cow is sacred to the Hindu. A cow can stand in his front door, hand out, admiring the landscape, or lie down in his flower bed or eat the spinach off his wife's hat—if she has a hat—and Mr. Hindu just says—"Lots of luck, Sis Cow!" He thinks it's cute.

But no electrical contractor should laugh. We have a sacred cow of our own in this business, worse than that.

Way back yonder, when young Tom Edison was selling his first lamp—or thereabouts—some smart electrician discovered that No. 14 wire was easy to handle. "O.K.!" senor. "I'll use it all the time." He did—and why not? He was only wiring for lights, so many on a circuit, one or two in a room and no desire for any more. People were used to one kerosene lamp and when they wired up, expected to stay wired. So No. 14 became the standard.

I well remember, after the Mexican War—or 1890, to be frank—my father built a new house in Jersey. We were using coal oil. Now it was to be electric light. I was there daily watching the job, assistant to the helper. Of course, we put in No. 14. And fifteen years later, when I was a contractor, we were still putting it in. And now it is thirty years after that and Old Reliable No. 14 is the same prime favorite in the trade, slapped up in every house and everywhere else they can use it.

The horse and buggy is gone. So is the cuckoo clock, the rat trap bustle, the shaving mug with name in gold. We are living in a brass' new world of aeroplanes, ice cubes, cellophane and shorts. All is changed—except the electrical contractor and his chronic silliness—Old No. 14. They have stuck together through thick and thin, closer than ham and eggs or pork and beans or pigs knuckle and sauerkraut.

Did I say it was a standard? Old No. 14 has become a sacred tradition with the contractor—almost a religion. One God! One flag! One wire! *E pluribus unum!*

Genghis Khan, the Tartar, in the sixteenth century, built him an empire that embraced all northern Asia from the Pacific right through Russia and rode his Mongol horde west to the walls of Vienna, while the churches of Europe rocked with prayers for the [illegible] Christianity. Genghis rolled [illegible] raped 'em in a big way and [illegible] laws so feared that they [illegible] force for forty years after [illegible] Beside him Alexander, Julius [illegible] and Napoleon were bush [illegible] Old No. 14 makes even all [illegible] look a piker. For No. 14 has [illegible] for more than half a century [illegible] king around the world, [illegible] the main switch to what-has-[illegible] every house where guys eat [illegible] down to dinner.

But it isn't very funny. It's [illegible] because right now twenty [illegible] families in this country—[illegible] knows how many stores and [illegible] factories—are suffering today [illegible] great American almost no-[illegible] tric service. And the entire [illegible] industry is sick in bed with [illegible] doesn't know it. For this [illegible] the branch circuits of all these [illegible] is blocking the further growth [illegible] electrical business—blocking [illegible] tractor, the dealer, the wholesaler, [illegible] ufacturer and power company [illegible] about time we looked this thing [illegible] face.

Let's check up now and see [illegible]

10 *Electrical Contracting, Aug[illegible]*

HERE IS WHY G-E HOME WIRING IS THE ANSWER

General Electric Home Wiring is based upon sufficiently large conductors — plus scientific arrangement of feeders, and location of load centers so that every outlet receives full normal voltage at all times.

THIS LAMP gives full — 100% light output at 100% rated voltage. BUT — at 90% rated voltage, *your* customer will get only 69% of light output. He loses 16 cents out of every dollar he pays for electricity!

THIS VACUUM CLEANER *wants* to do *your customer's* housework. BUT a choked circuit that gives it only 90% of rated voltage will pull its efficiency down to less than 90% — and so the houseworker must work longer.

A GOOD PE[illegible] HOW[illegible]
C O L A T O[illegible]
works at full [illegible]
ciency at 10[illegible]
rated voltage [illegible]
BUT — wh[illegible]
the voltage is [illegible]
duced 10%, [illegible]
takes mu[illegible]
longer to fi[illegible]
coffee making, uses more electricity [illegible]
and consequently costs more.

These same facts apply to every other electrical device — satisfactory service at normal voltage — serious losses and inconvenience at reduced voltage.

G-E HOME WIRING

ON A SILVER PLATTER

FULL COMFORT FOR THE CUSTOM[illegible]

UMI

T F G-E HOME WIRING

Our Sacred Cow!

NUMBER 12—says "How about me?" But nobody listens. Old No. 14 has come to be a binding tradition.

HOW G-E HOME WIRING ECONOMICALLY ELIMINATES APPLIANCE LOSSES

Electrical convenience is, of course, assured in any home by properly placing a sufficient number of outlets for lighting, for plugging-in-appliances and for switch control. The use of any good electrical standard of adequacy will guarantee full convenience and comfort to the home.

Proper voltage at these outlets, however, cannot be assured unless careful planning and good engineering have been given to the electrical conductor layout and arrangement as well as to the electrical control. It is to this part of the electrical system that G-E Home Wiring assures competency without undue expense.

THREE ESSENTIAL REQUIREMENTS

G-E Home Wiring meets the three essential requirements of successful wiring in the following ways:

1. *Main Distribution Conductors and Control Units* — The size of these conductors is determined by a careful check of the power required for the whole house. The National Electrical Code rules assure proper conductor sizes and also the proper main distribution unit of control.

2. *Sub-feeder Conductors and their Control Units* — It is here that G-E Home Wiring methods depart from the usual practice of today. Convenient, centrally located control points are selected on each floor. To these points, large sub-feeders are run from the main distribution control unit. At the end of these sub-feeders, a sufficient number of control units are placed to protect and control the final circuits.

3. *Short Runs for the Final-circuit Conductors* to which are attached the various outlets. Here again, G-E Home Wiring differs from the common unsatisfactory practice of today. Common practice, of course, runs a final circuit conductor as one long string from the central point with outlets along the way, like the long tail of a kite with bows along its length. G-E Home Wiring methods recommend that a final circuit be divided up into a number of final sub-circuits which radiate from the control unit like the rays of the sun. Each sub-circuit serves only a few outlets.

Thus we have each control unit protecting the same number of outlets as in the old way of wiring, but none of these outlets is very far away from its control unit or from the main arteries of the system. These short runs are like veins from the main arteries. They give plenty of life to the house with ample power at the right pressure.

G-E HOME WIRING IS FLEXIBLE

Such a system is not expensive in comparison with conventional wiring done adequately. Two or three short, heavy runs replace the large number of old long runs that reach back to some corner in the cellar.

Several examples of G-E Home Wiring which illustrate the description just given are shown on the following pages. They show how flexible G-E Home Wiring is. And these examples indicate only a few of the many ways in which G-E Home Wiring can be installed. You can easily adapt the essential elements of G-E Home Wiring in any way best suited to your needs and requirements.

ULL PROFIT TO THE CONTRACTOR

SPECIFICATIONS FOR G-E HOME WIRING SYSTEMS

1 SERVICE

The service is composed of the conductors and equipment for delivering electrical energy from the main or feeder, or from the transformer to the wiring system of a building.

2 SERVICE HEAD

The service head or other service entrance fitting shall be so installed that it properly holds and protects the service cable. The service head shall be used where service conductors and main feeder conductors are joined together.

3 SERVICE ENTRANCE

The service entrance consists of service entrance cable or rubber-covered conductors in rigid conduit. It shall be installed from the service head to the main distribution unit. (See also No. 5 — Main Feeder Conductors.)

4 OUTDOOR METER

The outdoor meter shall be installed in accordance with the requirements of the local utility. The meter box shall be equipped with meter test clips wherever necessary. If an indoor meter is installed it also shall be installed in accordance with the requirements of the local utility.

5 MAIN FEEDER CONDUCTORS

The main feeder conductors shall be of sufficient size to insure satisfactory voltage at the main distribution unit. The conductors shall be installed in an approved cable assembly or rigid conduit. (See also No. 3 — Service Entrance.)

6 MAIN DISTRIBUTION UNIT

The main distribution unit shall be of the proper size for the total connected load. It shall contain the main fuse or breakers, the range fuses or breakers, (as desired) and the protective devices for the other fixed equipment in the basement. In all cases the local utility shall be consulted in regard to type and meter sequence, etc., before the main distribution unit is installed.

7 SUB-FEEDER CONDUCTORS

Sub-feeder conductors shall be installed from the main distribution unit to the branch distribution units. The method used for the installation of these sub-feeders depends on local ordinances and rulings. Sub-feeder conductors shall always be of a size large enough to assure good voltage conditions at the branch distribution unit, and shall be at least one size larger than the final circuit conductors.

8 BRANCH DISTRIBUTION UNIT

The branch distribution units shall be located as near, centrally, to the load in each floor as is possible. They may be fuse or circuit breaker units but if CIRCUIT BREAKERS ARE USED IN THE BRANCH UNITS, CIRCUIT BREAKERS SHOULD ALSO BE USED IN THE MAIN DISTRIBUTION UNIT. The branch distribution unit shall control all final branch circuits.

9 FINAL-CIRCUIT CONDUCTORS

The final-circuit conductors run from the branch distribution unit to the outlets. Instead of connecting all outlets in one circuit on one long run of conductor from the branch distribution unit to the last outlet, it is recommended that the number of outlets be divided evenly and placed on 2, 3 or 4 short branch sub-circuits, each one of the branch sub-circuits forming part of the final branch circuit radiating from one breaker or fuse.

10 JUNCTION BOXES

Junction boxes, switch boxes and outlet boxes and fittings shall be furnished as needed.

11 OUTLETS

The outlets for light and convenience shall be placed in the different rooms of the home so as to conform with up-to-date adequacy standards. Switches and lights shall be installed so as to make it possible to have a continuous path of light when walking through the house. Convenience outlets in rooms where a number of floor lamps are used shall have one side of the outlets switch-controlled where so desired.

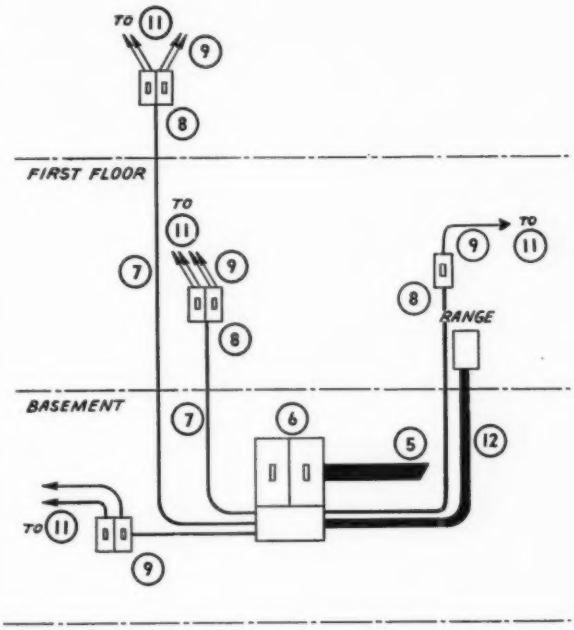
12 RANGE WIRING

The wiring to the range shall, in all cases, be of a capacity large enough to permit full-load operation of the range. The protection for the range wiring shall either be located in the main distribution unit or directly behind the range in the kitchen, in accordance with local rules and ordinances.

ON A SILVER PLATTER

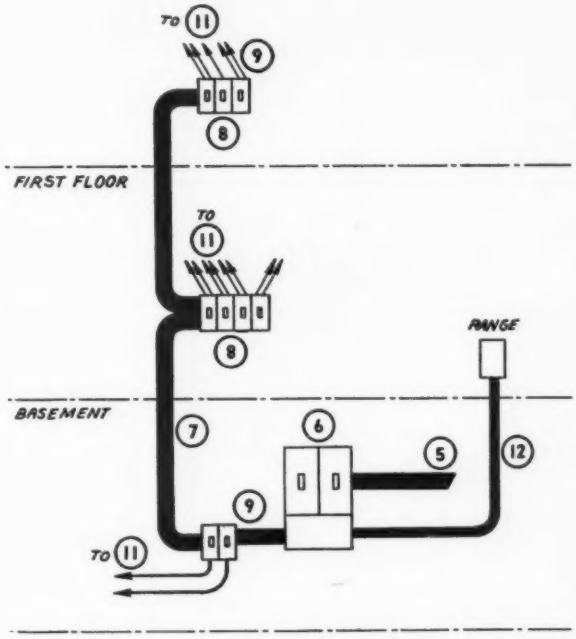
FULL COMFORT FOR THE CUSTOM

THIS IS ONE WAY TO DO IT



Note the risers to the load centers on first and second floors. This installation was made in accordance with Section 2434d of the N.E.C. 1937 Edition, which allows the use of feeder without protective devices in the main distribution unit. Economical for smaller residences with a limited number of branch circuits.

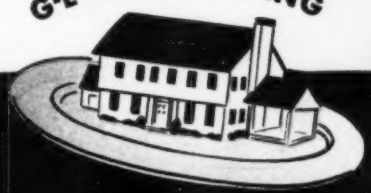
THIS IS ANOTHER WAY TO DO IT



Here, one heavy feeder runs to the first and second floor load centers. Inasmuch as the feeder is of the same size as the service entrance cable, the protective devices in the main distribution unit protect this feeder. There are also no code limitations to the length of the feeder or to the number of protective devices which it serves.

DO IT YOUR OWN WAY

G-E HOME WIRING



ON A SILVER PLATTER

LL PROFIT TO THE CONTRACTOR

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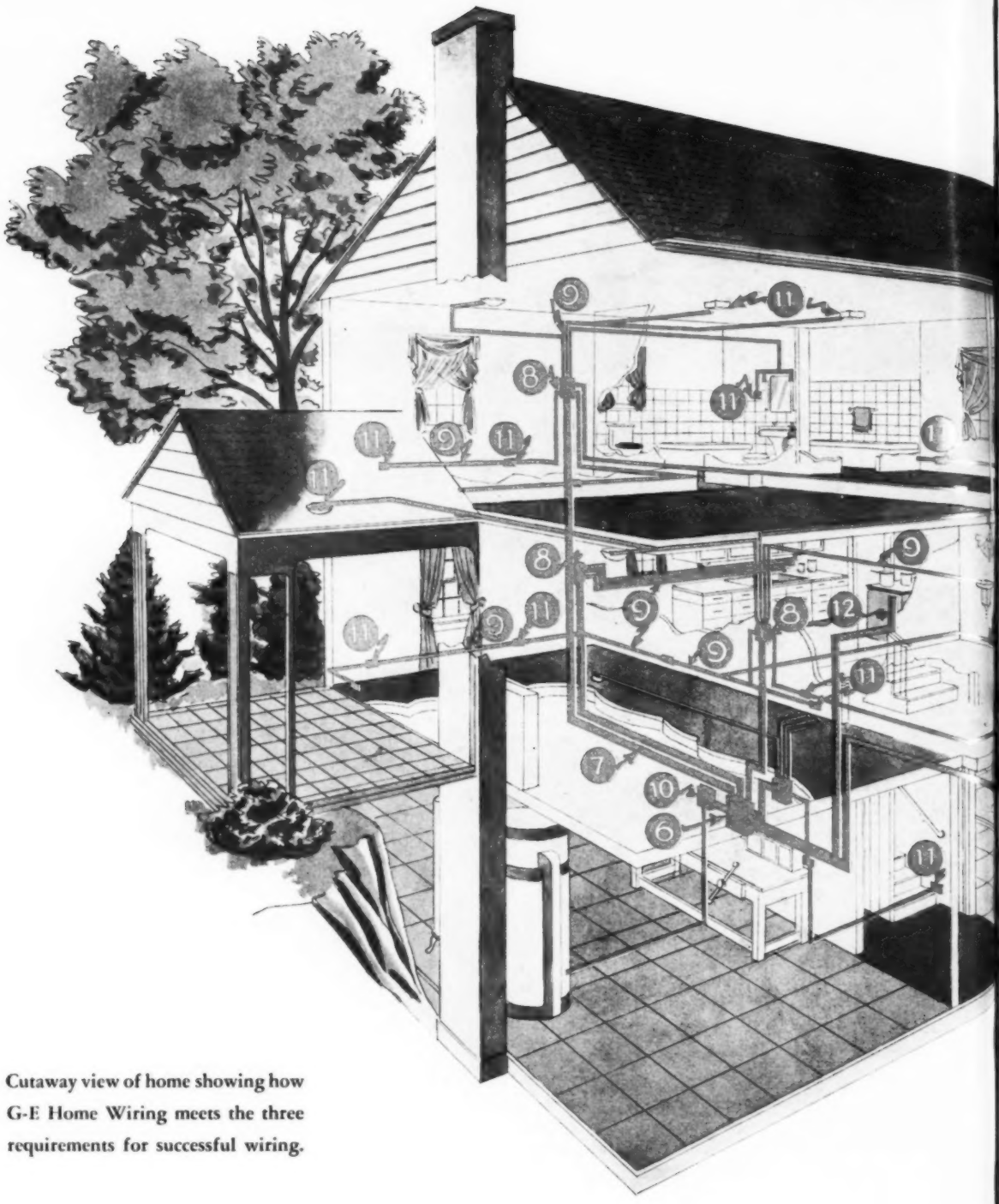

Cutaway view of home showing how G-E Home Wiring meets the three requirements for successful wiring.

G-E HOME WIRING

ON A SILVER PLATTER

FULL COMFORT FOR THE CUSTOME

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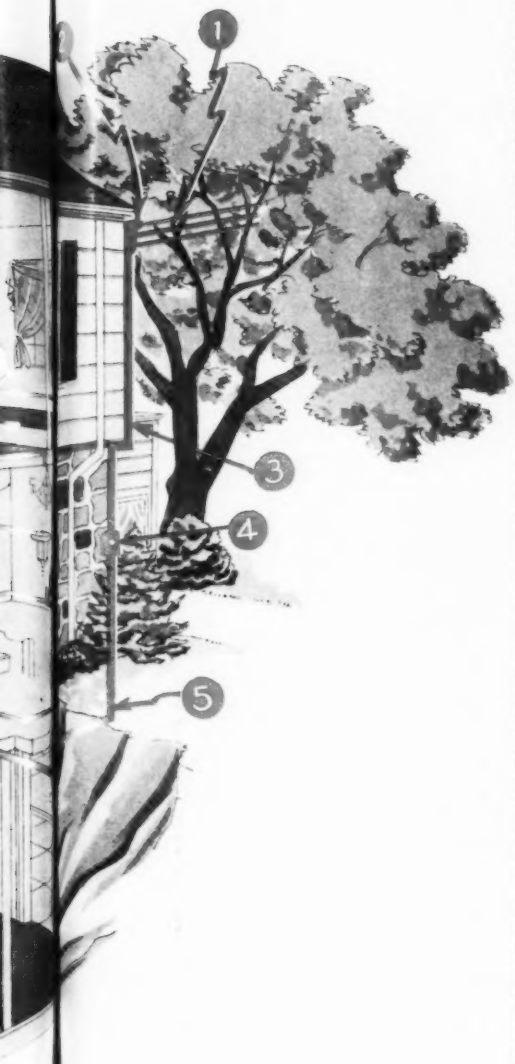
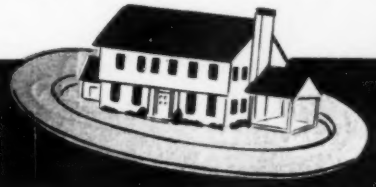


EXPLANATION OF NUMBERS

1. Service
2. Service Head
3. Service Entrance
4. Outdoor Meter
5. Main Feeder Conductors
6. Main Distribution Unit
7. Sub-feeder Conductors
8. Branch Distribution Unit
9. Final-circuit Conductors
10. Junction Boxes and Fittings
11. Outlets
12. Range Wiring

G-E HOME WIRING



ON A SILVER PLATTER

MELL PROFIT TO THE CONTRACTOR

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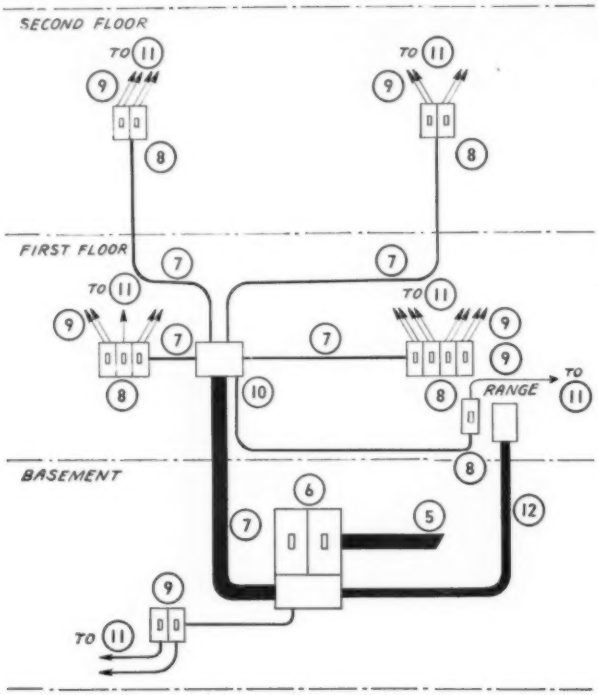
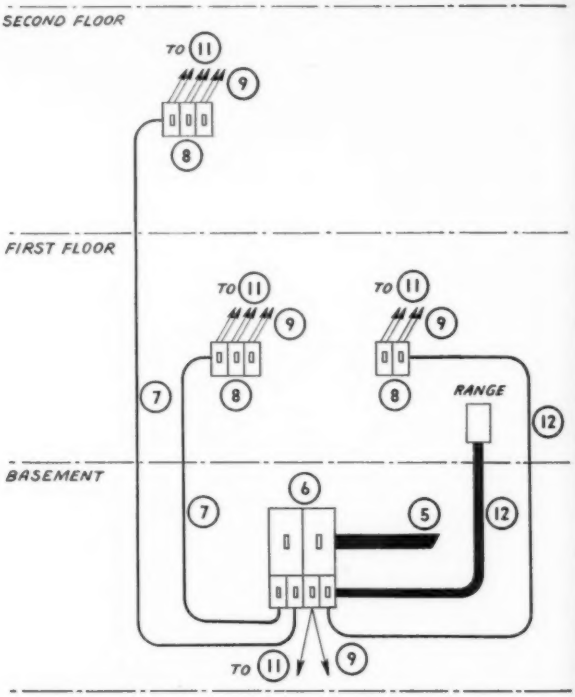
THIS IS ANOTHER WAY TO DO IT



A combination of the methods in the first two layouts is employed here. A single feeder of the same size as the service entrance cable is run to a central point on the first floor. From there smaller feeders are installed, in accordance with Section 2434d of the N.E.C., 1937 Edition, which service branch load centers on the first and second floors.

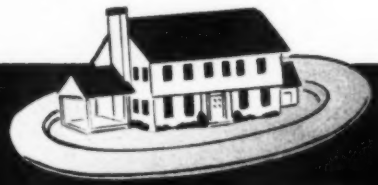
THIS IS ANOTHER WAY TO DO IT



Here, the feeders are protected in the main distribution unit. This method permits feeder sizes which are not limited in length or number of protective devices served by them. The protective devices for the feeders must, of course, have a rating high enough for the load which is served by them. Probable diversity factor may be taken into consideration.

G-E HOME WIRING

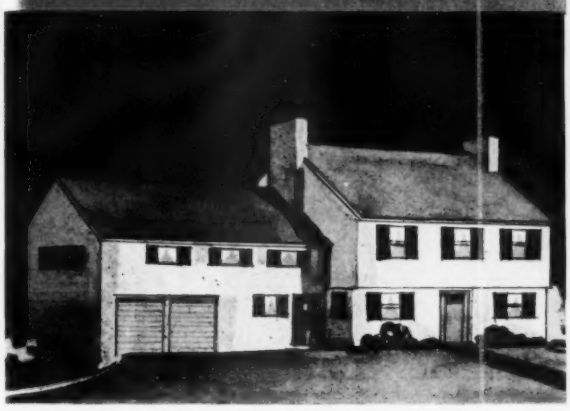
DO IT YOUR OWN WAY

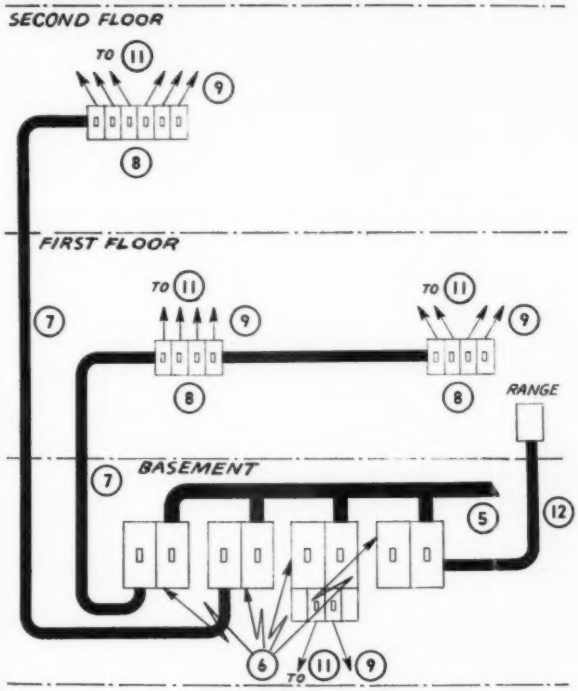


ON A SILVER PLATTER

FULL COMFORT FOR THE CUSTOM

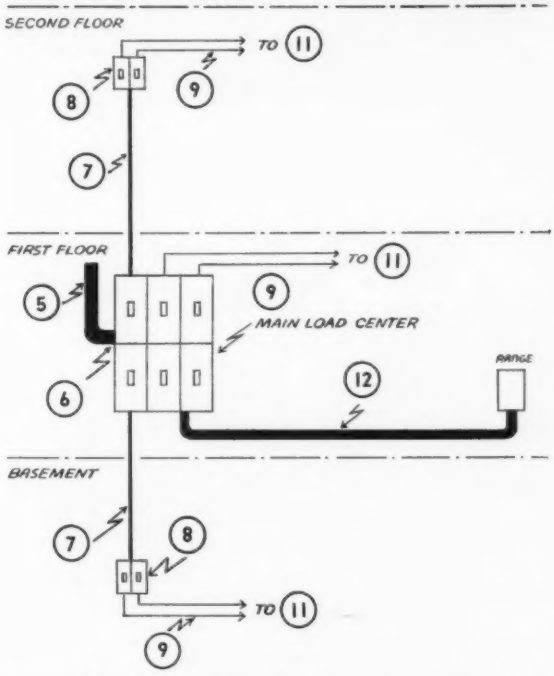
THIS IS ANOTHER WAY TO DO IT





Here a 200-amp. main distribution unit is split into four 50-amp. distribution units. This method is possible according to the 1937 Edition of the N.E.C., Section 2351a. This method of wiring will be found advantageous where a large main distribution unit makes the installation of sub-feeders or a main feeder as shown in the first two diagrams economically prohibitive.

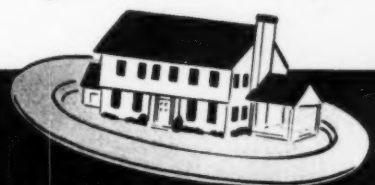
THIS IS ANOTHER WAY TO DO IT



Since multi-breaker panels of low cost are now available, the method of wiring shown here might be economical, especially when the service entrance conductors enter at the first floor. No main distribution unit is necessary as per Section 2351a of the 1937 Edition of the N.E.C. Multi-breaker panels can be mounted in the kitchen or in the back hall.

DO IT YOUR OWN WAY

G-E HOME WIRING



ON A SILVER PLATTER

LL PROFIT TO THE CONTRACTOR

G-E HOME WIRING IS EASY FOR THE CONTRACTOR TO INSTALL...

because *every bit of material* can be bought from one manufacturer, backed by a uniform guarantee, and designed to fit together and operate together . . .

Just choose the items you need from these outstanding catalogs and place your order with your G-E distributor.

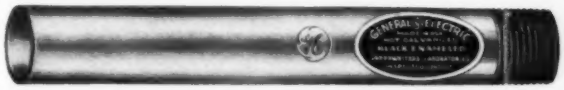
G-E HOME WIRING

ON A SILVER PLATTER

FULL COMFORT FOR THE CUSTOMER

G-E WIRING MATERIALS

Illustrated are a few of the many G-E Wiring Materials available for G-E Home Wiring installations. The line is complete.



G-E White Rigid Conduit is thick-walled steel tubing, galvanized and Glyptal-coated inside and out, which can be connected at all joints with threaded fittings.

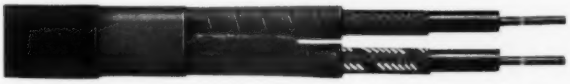
G-E Service Drop Cable, Type SD — For "Tamper-proof" overhead service entrance from pole to building. Available in 3-conductor and 2-conductor assemblies.

G-E Service Entrance Cable is "Tamper-proof" — for use from point of attachment of Service Drop Cable at building to the distribution center.

Type SE, Style U

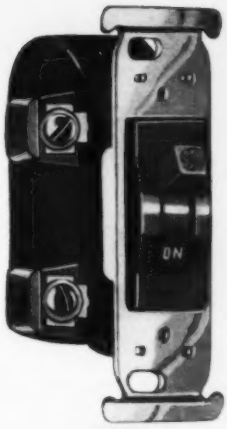
Type SE, Style A, Concentric Type.

G-E BX Armored Cable consists of one or more rubber-covered wires with a moisture-proof wrapping covered by a flexible interlocking steel-strip armor.



G-E BraidX Non-metallic Sheathed Cable consists of two or more rubber-insulated conductors in a special protective covering having high resistance to mechanical injury.

G-E Rubber-insulated Wire and Cable is made in three grades of insulation, all with flame-retarding finish which will not support combustion and protects against moisture.

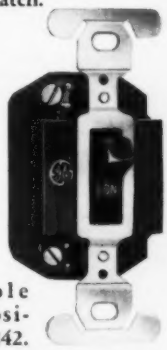


The line of G-E Boxes and Fittings is complete.

G-E Branch-circuit Circuit Breakers serve both as a means of overload protection for the branch sub-circuits and as master control switches. Available in 15-, 20-, 25-, 30-, and 35-amp capacity, single-pole 125-volt, a-c and d-c, for flush mounting in standard outlet boxes with raised covers.

GE2708 — Pull-type — Insulated Chain, Textolite Body, Threaded-ring Catch.

Twin Outlet with One Outlet Controlled by a Switch, the Other Outlet Uninterrupted — Four Binding Screws, Separate Feeds, Separate Ground GE2902.

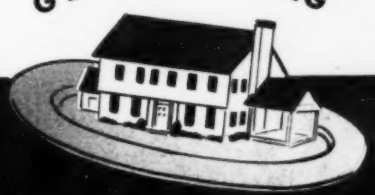


Single-pole Switch, Composition Body, GE2842.

Single-pole Switch Heavy-duty Type, Textolite Body, GE2923.

G-E Range Outlet for Surface Mounting with "Unicord" Set GE-3001.

G-E HOME WIRING



ON A SILVER PLATTER

LL PROFIT TO THE CONTRACTOR

UMI

ALWAYS SEND YOUR ORDER TO ONE OF THESE OUTSTANDING GENERAL ELECTRIC DISTRIBUTORS

Ala., Birmingham—Matthews Electric Supply Co.
Ala., Montgomery—Matthews Electric Supply Co.
Ariz., Phoenix—G-E Supply Corporation
Cal., Fresno—G-E Supply Corporation
Cal., Long Beach—G-E Supply Corporation
Cal., Los Angeles—G-E Supply Corporation
Cal., Oakland—G-E Supply Corporation
Cal., Sacramento—G-E Supply Corporation
Cal., San Diego—G-E Supply Corporation
Cal., San Francisco—G-E Supply Corporation
Colo., Denver—G-E Supply Corporation
Colo., Denver—Hendrie & Bolthoff Mfg. & Sup. Co.
Colo., Pueblo—Hendrie & Bolthoff Mfg. & Sup. Co.
Conn., Bridgeport—G-E Supply Corporation
Conn., Hartford—G-E Supply Corporation
Conn., New Haven—G-E Supply Corporation
Conn., Waterbury—G-E Supply Corporation
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Fla., Jacksonville—G-E Supply Corporation
Fla., Miami—G-E Supply Corporation
Fla., Tampa—G-E Supply Corporation
Ga., Atlanta—G-E Supply Corporation
Ga., Savannah—G-E Supply Corporation
Idaho, Boise—G-E Supply Corporation
Ill., Chicago—G-E Supply Corporation and branches
Ill., Chicago—Hawkins Electric Co.
Ill., Chicago—Metropolitan Electrical Supply Co.
Ill., Decatur—Morehouse & Wells Co.
Ill., Peoria—Universal Electric Co.
Ill., Quincy—Crescent Electric Supply Co.
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Ill., Springfield—G-E Supply Corporation
Ind., Evansville—G-E Supply Corporation
Ind., Fort Wayne—Protective Electric Supply Co.
Ind., Indianapolis—G-E Supply Corporation
Ind., Muncie—G-E Supply Corporation
Ind., Richmond—Richmond Electric Co.
Ind., South Bend—South Bend Electric Co.
Ind., Terre Haute—Advance Electric Co.
Ia., Burlington—Crescent Electric Supply Co.
Ia., Davenport—Crescent Electric Supply Co.
Ia., Des Moines—G-E Supply Corporation
Ia., Dubuque—Crescent Electric Supply Co.
Ia., Mason City—Crescent Electric Supply Co.
Ia., Sioux City—G-E Supply Corporation
Ia., Waterloo—Crescent Electric Supply Co.
Kan., Wichita—G-E Supply Corporation
Ky., Louisville—G-E Supply Corporation
La., New Orleans—G-E Supply Corporation
La., Shreveport—G-E Supply Corporation
Me., Bangor—G-E Supply Corporation
Me., Portland—G-E Supply Corporation
Md., Baltimore—G-E Supply Corporation
Mass., Boston—G-E Supply Corporation
Mass., Boston—Milhender-Afes Elec'l Co.
Mass., Lynn—Des Roberts Elec'l Sup. Co.
Mass., New Bedford—Mendell Electric Supply Co., Inc.
Mass., Springfield—G-E Supply Corporation
Mass., Worcester—G-E Supply Corporation
Mich., Battle Creek—Central Electric Supply Co.
Mich., Detroit—G-E Supply Corporation
Mich., Detroit—Frank C. Teal Company
Mich., Grand Rapids—G-E Supply Corporation
Mich., Kalamazoo—G-E Supply Corporation
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Mich., Muskegon—Fitzpatrick Electric Supply Co.
Mich., Saginaw—G-E Supply Corporation
Minn., Duluth—G-E Supply Corporation
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N. J., Newark—G-E Supply Corporation
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Pa., Erie—G-E Supply Corporation
Pa., Harrisburg—Raub Supply Co.
Pa., Johnstown—G-E Supply Corporation
Pa., Lancaster—Raub Supply Co.
Pa., Philadelphia—G-E Supply Corporation
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Pa., Reading—G-E Supply Corporation
Pa., Scranton—G-E Supply Corporation
Pa., Williamsport—Lowry Electric Co., Inc.
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Wash., Spokane—G-E Supply Corporation
Wash., Tacoma—Home Electric Company
W. Va., Bluefield—Bluefield Supply Co.
W. Va., Charleston—Virginian Electric, Inc.
W. Va., Wheeling—Gee Electric Company
Wis., Appleton—G-E Supply Corporation
Wis., La Crosse—G-E Supply Corporation
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Wis., Milwaukee—G-E Supply Corporation

GENERAL ELECTRIC CO., APPLIANCE AND MERCHANDISE DEPT., BRIDGEPORT, CONN.

INDUSTRIAL **LIGHTING** COMMERCIAL

The Gentle Art of Selling *Light*

EVERY contractor knows that light is the backbone of the electrical business. Without the universal need for light, there would not be much wiring in homes, stores, offices—and not too much in factories. But all this is so obvious, a lot of men just let it go at that.

"So what?" you say.

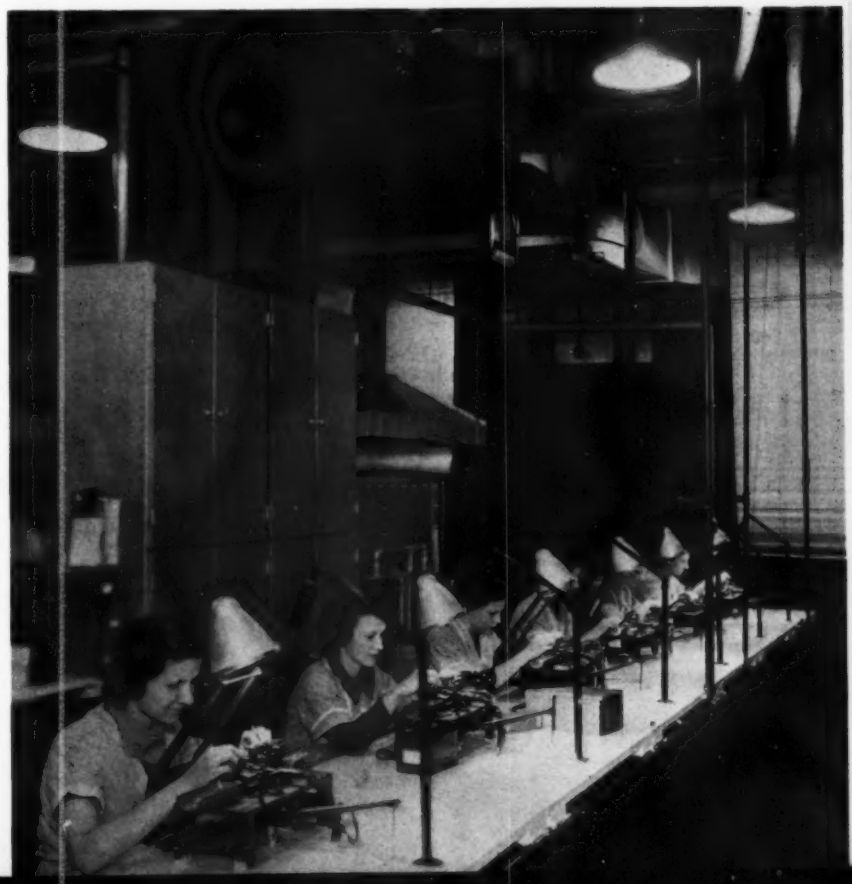
So most contractors are taking light for granted. They let the lamp and reflector people do the worrying about developing the market. They forget that clean people use more soap than dirty ones—that the best place to sell smart neckties is on Fifth Avenue or Michigan Boulevard where everybody wears one. They forget that every building in town—now using light—is a possible market for better lighting and that many of them offer a chance for immediate profit.

The gentle art of selling light is after all merely a matter of picking the people who need improved lighting and pointing out why. Many of these people are already your customers. Many more will be—if you show them what should be done. It is as easy as that.

The following pages of this Lighting Section offer practical suggestions to help you sell lighting—industrial and commercial. It is largely a matter of attitude and approach, of organizing yourself and making simple preparations. Then instead of going round blindly looking for business, you select the prospects that—for a reason—offer the best chance for quick sales. And there is a very definite way to do this.

No attention is given here to lighting technique—what kind of lighting equipment to use. Every contractor already knows more about that than could be crowded into these few pages. Also, this information is readily at hand. Use the *Illumination Design Handbook* and the book *Artificial Light And Its Application* from Westinghouse Lamp Company, or the books *Illumination Design Data* and *Lighting Data Bulletins* from Nela Park. Use the *Handbook of Interior Wiring Design*, available from NECA. Use the splendid guiding data that the lighting equipment manufacturers have prepared.

But before you can specify equipment you must find the customers and make them want better light. And that is what these pages are concerned with.



FINE SEEING *tasks need accurately controlled high intensity local lighting. These individual units give a fine balance with general illumination.*

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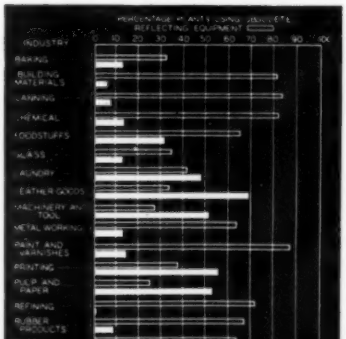
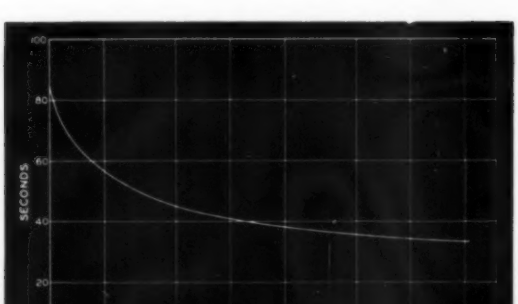
Who Needs Industrial Lighting?

IN your town there are many factories. All of them use light. Many of them need better light. You know that—but you do not know which ones. You cannot easily visit every one of them and look their present lighting over. What to do?

In 1933 and '34, surveys were made by the Illuminating Engineering Society to determine lighting conditions in various industries. The accompanying chart and table show the result, as presented in a report by H. B. Dates of the Case School of Applied Science, Cleveland. As you will see, at that time the lighting equipment in 83 per cent of the canning factories was more than ten years old. In 63 per cent of the metal working plants it was obsolete, and in 62 per cent of the wood working plants. Also a third of the bakeries, two thirds of the candy and dairy plants, nearly half of the laundries, and a third of the print shops had not modernized their light during that period. And only a few have done so since then.

This is true in your city as well as nationally. These are the local spots where selling light is easiest. Because, wherever the light is bad, that manufacturer is having troubles that he will gladly correct, once he is shown what to do. In every case, you will find work is slow, spoilage is high, rejects are too many or inspection is imperfect and customers are complaining.





OBSOLETE EQUIPMENT — *Startling obsolescence of lighting equipment prevails in many types of industries, with average intensities far below reasonable standards.*

PERFORMANCE TEST—*The time curve on performing a specific visual task drops as the level of illumination is raised. This proves the answer to one of the major industrial problems.*

In the laundry it may be soap specks on the hotel linen. Metal workers will over cut. Chocolates will be improperly dipped. Canners will find imperfect fruit in select grades. Printers will turn out jobs with poor alignment or type errors. Everywhere that light is failing the workers, poor work is wasting money, and the management is waiting for the contractor to show them what to do.

The sensible approach to selling light in your town, therefore, is to pick out those industries where the prevailing lighting is bad. Then visit them with a lightmeter in your hand. Tell the management you think you can show them how they can save some money. Then wander through the plant. Watch for the difficult seeing tasks. It may be a poorly lighted grinder, mixer, lathe or labeling machine. It may be work at benches or tables, where the foot-candles are down. There will be spots where glare is causing eye strain and headaches and accidents to work or workers follows.

Go into your local chemical works, the cannery, the box factory, the sausage plant, the clothing factory and other places where the processes call for good light. Check up the situation *from their point of view.* Then show them what to do.

CONDITION OF LIGHTING EQUIPMENT IN INDUSTRIES

Classification of Manufacture	Federal Census — Number of Plants of This Type	Average Age of Present Lighting Equipment in Years	Average Foot-Candle Intensity	Per Cent Increase in Light Necessary for Good Illumination	Per Cent of Plants Using Obsolete Reflecting Equipment
Baking	15,684	7.5	1.24	195.0	32.1
Building materials	14,792	8.1	0.5	1500.0	82.0
Canning	2,917	11.7	0.6	1150.0	83.4
Chemical manufacturing	8,871	9.3	1.3	208.0	81.7
Foodstuffs, candy, dairy	46,113	8.9	3.1	271.0	65.2
Glass	8,478	5.6	1.2	460.0	35.0
Laundry	21,926	5.5	4.75	139.0	41.3
Leather goods	4,796	6.5	6.88	62.5	33.7
Machinery and tool manufacturing	11,807	6.57	5.1	106.5	27.3
Metal working	12,021	9.57	1.3	562.3	63.7
Paints and varnishes	923	17.1	1.4	494.0	87.3
Printing	22,725	5.4	5.5	109.8	37.6
Pulp and paper manufacturing	3,783	10.0	5.29	193.0	25.0
Refining	2,906	6.8	0.02	592.5	72.0
Rubber products	498	7.2	0.8	496.0	67.3
Shoe manufacturing	1,460	4.3	1.8	263.0	63.4
Textiles and clothing	24,443	5.3	7.0	115.2	21.3
Woodworking	16,527	4.0	3.6	367.0	62.4
Totals and averages	220,670	8.74	2.85	404.7	54.0

How To Sell A Print Shop

LIGHT means accuracy and speed in the printing industry. If a 90¢ printer avoids two or three minutes of lost motion per day, because of better lighting, this 1½¢-per-minute saving quickly pays its cost-per-man investment. When workers' eyes are weary, from fighting shadows, their morale and efficiency goes down. Shoddy work, costly errors, delayed production schedules and spoilage are the result. The printer will buy light, if he sees it will save him from these troubles. He has no interest in reflectors, outlets, foot-candles, or circuits, except as they can make money for him.

Matching of colors, protection of expensive half-tones, detection of errors in type selection and alignment, and imperfections in make-ready and delicate machine adjustments are all tasks that depend on comfortable seeing conditions. Only artificial illumination is practical, and adequate light can be provided for a surprisingly low percentage of the hourly cost to operate various machines or departments.

Some typical departments and operations where improved lighting can make money for the printer are—

Type Work—At type cases, imposing stone, linotype, monotype, bed of presses.

Press Operations—Make-ready, such as overlay and underlay, straightening up, registering, marking out, spotting up, distribution of ink; adjustment of guides, grippers, feed and delivery mechanisms.

Inspection of proofs at the press.

Safe illumination around press for adjusting while in motion.

Detection of work-ups—in type, cuts or furniture, dirty cuts, off-setting, smudging, slurring, poor distribution, quality or color of ink.

Final inspection as to color and register.

Off-Set Printing — Make-ready on press; clamping, register, adjustment of water and ink flow, of guides and grippers, blanket and zinc underlays.

Photographic and developing processes.

Stripping, opaquing, line-up and retouching of negatives.

Preparation of zinc and contact printing.

Photogravure Processes—Retouching, stripping, line-up printing, checking.

Cylinder-layout, staging, etching.

Copy-work—Preparation of copy, cuts, layout, dummies.

Proofreading.

Bindery Operations — Machine and Bench

Here are some of the conditions that sell good lighting today, when they are pointed out to the printer—

1. Greater use of color, metallic inks and varnish have increased the glare on printed surfaces, as well as the need for accurate inspection.

2. Color discrimination must be uniform in all departments, by day or night, and this is only possible by artificial light.

3. Accidents, spoilage and machine breakage often result from adjustments and inspections made at out-of-the-way press levels with rigged extension lights.

4. It costs money when pressmen have to carry sheets to a window or to a well lighted spot for close inspection.

5. Danger lurks in the shadows of fast-moving machines and accidents cost more than the replacing of bare lamps and tin shade drop lights.

6. Make-ready costs often eat up the profit margin because of wasted steps and motions during inspections and press adjustments, that correctly located lighting will avoid.

7. The irregularities of type faces cast an infinite number of light reflections that cause eye strain at type cases, imposing tables, make up banks and cylinder inspection racks, which only glareless lighting can prevent.

8. Preparation of copy, cuts, layouts, dummies, as well as composition, make-ready and press work often run into weary overtime. Therefore, night work should be made as comfortable as the daylight shift.

9. Speed tests of proofreaders recently revealed a 35 per cent increase in the number of errors discovered when light intensity was raised from 8 to 50 foot-candles.

A detailed study of lighting in the printing industry published by the Illuminating Engineering Society, provides splendid sales material for use in selling the printshop. In it is a study in costs, that should be of interest to any prospect in this field.

WIDE-AREA *fixtures in this printing plant give low uniform brightness over all light-reflecting type surfaces, reduce shadows and provide eye-comfort.*

UMI

BLENDED LIGHTING *of mercury and Mazda units combine to insure efficient production, in this section of a western aviation factory.*

SPOTLIGHTING *of close-seeing tasks helps on planers, lathes, milling machines and grinders. Here adjustable intensifiers supplement good general lighting.*

The Cleaning and Pressing Industry

IN spite of numerous critical seeing tasks, good lighting is rare in the cleaning and pressing industry. But the lighting man has strong arguments to help his selling—

1. The averages of spotless or flawless garments can be raised, so that fewer garments must be returned to spotters by inspectors.

2. The number of garments being regularly returned by customers can be reduced.

3. The first saving is in plant production costs, and the next is in lowered delivery costs, a strong combination.

4. Finally, fewer returned garments lessens the number of disgruntled customers. Better work means prompt collections.

Between the first operation and the final delivery are several important departments where good lighting is needed. These are—

—Checking and marking
—Cleaning
—Examination and spotting
—Repair and alterations
—Machine and hand finishing
—Final inspection

The spotter should have a low-brightness, large area source approximating 150 foot-candles over the work area. Final inspection work requires a similar level of illumination, with a degree of color correction. In most cases the light source should be directed at an angle to suit the inspector. From these higher levels, the requirements recede. For hand finishing, about 50 foot-candles in local or supplementary lighting is most suitable. Some plants will be found using considerable light, but need corrections in outlet locations to place the fixtures at their most efficient position.

The general benefits of lighting modernization are:—

1. Correct lighting for checkers will disclose stains, torn cloth or other defects on expensive garments, thus catching possible claims before such work is routed through the normal processes.

2. Better spotting after first cleaning operation saves delay and rejects by final inspector.

3. Careful cross-lighting at finishing bucks and hand finishing boards eliminates annoying shadows, speeds production, reduces fatigue, lessens percentage of creased or wrinkled garments.

4. Color correction at inspection racks will catch more indistinct spots, save customer complaints.

5. Correct general lighting, plus correct supplementary units provide better contrast, cheerful atmosphere, less hazard of stumbling and accidents at machinery.

6. Less errors of identification in checking mean fewer claims to settle on mis-delivery of expensive garments.

The cost per hour to operate modern lighting equipment, in comparison with estimated hourly operating costs in typical departments of this industry, has been compiled by the Illuminating Engineering Society. With this information the lighting man can survey a plant, and make a true report which provides a comparison with departmental operating costs. Plant check-ups show a 12 to 33 per cent return of garments from the final inspector to the spotter or finisher, and ¼ to ½ of one per cent returned to the plant by customers. A reduction of 25 per cent in returned garments can go far toward paying the cost of modernizing the lighting system.

How to Sell a Candy Factory

CLEANLINESS is king in the candy factory. Also strict sanitation laws are enforced as a public safeguard. So good lighting has become vital in this industry—for who wants to buy candy made in a dingy workshop?

Correct lighting makes year-round cleanliness easier because it exposes sloppy workers, and forces them to be less wasteful. The monotonous routine of chocolate dipping, cleaning and adjusting machinery, and many hand-to-hand operations run along smoothly. Careful studies can be made to show how this means economies to the owner.

Candy making has rapidly evolved from the rear of stores, and the home kitchen. With the steady growth of this business, machines and tables have been added, but the lighting system has often failed to catch up with hasty expansion. Here is where your selling job begins. And it is not complete until every department has been given a complete investigation, such as—

Five-roller refiners—Chocolate processing needs intense light.
Chocolate Dipping—Calls for a uniform wide distribution.
Kiss Wrapping Machines—Many critical seeing points to be covered.
Mold Fillers for Gum Drops—Wiping and cleaning positions important.
Hard Candy Forming—Many critical points here.
Hard Candy Mixing Tables—Uniform wide distribution required.
Assorted Candy Packing Tables—Need uniform wide distribution.
Special Candy Decorating—Well designed local units are helpful.
Box Scoring—Good lighting at dies important.
Box Decorations—Avoid eyestrain at art work tables.
Generally — At gauges, adjustment points lighting should be good.

Hand labor is a big item in this industry so there are many places where good light will speed the work and save loss in spoilage, for example:

1. Dipping, sorting, hand packing or wrapping chocolates and fancy hard candies are progressive operations that must be kept in balance.

2. Where chocolate is made from cacao beans, processes of toasting, shelling, crushing, pulverizing and mixing all call for close attention to the various localized illumination needs.

3. In the cooking and other preparatory processes for creams and hard candies there are many places to improve safety, reduce waste, or provide better control of product.

4. Departments where dipping, sorting and the decoration of special candies goes on vary widely in layout, light exposures and grouping of workers. Every improvement in illumination level, elimination of shadows, or prevention of glare will contribute through less waste and speedier output; more cheerful and cleaner surroundings; easier and closer supervision of production.

5. And don't forget the regular inspections, cleanings, adjustments, and running maintenance of rolls, grinders, wrappers, box making machines, pumps and other machinery. Look for the locations where operators need 20 to 50 foot-candles of easy-seeing local or supplementary light—and then specify a remedy for the condition.

Safety to employees working near automatic machinery such as rolls, sharp knives and dies, also represents a problem to management. Clearances are easily misjudged, where there are improperly lighted conditions at the key work positions around machines. Accidents cost money, broken machines spell heavy repair bills as well as delays and spoilage.

A recent survey by the Illuminating Engineering Society shows that candy makers have depended too much on using daylight. Yet rush seasons come when natural light is weak. Prior to Thanksgiving there is usualy a 30 per cent increase in output. Average plant output jumps up 65 per cent in November and December, for the Christmas trade, and again, before Easter.

How to Sell a Textile Mill

The textile industries offer a wide field for lighting modernization, because of their varied operations with difficult seeing tasks. For a large percentage of mills continue to use bare lamp drops, inefficient tin cone shades, and extremely low levels of general illumination.

These mills operate batteries of intricate machines, and the speed of their output is dependent upon how quickly many pairs of eyes and nimble fingers detect and mend a break. Breaks mean shutdowns, whether at slubbers, fly frames, spinning frames or other

COLOR DISCRIMINATION *is vital with these workers who match grades of cigars in a tobacco factory. Daylight enclosing globes and daylight lamps relieve eyestrain.*

SHADOWLESS ILLUMINATION *at high levels with general overhead distribution helps efficiency for massed operations at compact production lines.*

operations leading up to the loom or weaving stage.

Eye fatigue slows up the hands of workers and therefore interrupts work flow. Likewise eye fatigue lowers the factor of never-ending vigilance that is so vital to the weaver. Tired eyes miss the many defects that spell the difference between perfect material and seconds.

Mill owners are vitally interested in the economics of good lighting, because to properly light a large mill represents a sizeable investment. For instance, to light the weave shed for gray goods or denim costs from $6.50 per loom upwards. At this figure, the lighting cost is roughly .6 per cent of the value of the goods produced. To increase proper levels of illumination, with units selected for a low factor of brightness, the expense must be weighed in comparison with operating costs, also taking into account these other benefits to be derived:

1. Improvement in the quality of the goods as a whole.
2. Reduction of seconds.
3. Better supervision because of reduction of breaks.
4. Better cleaning and maintenance of machinery.
5. Fewer accidents.
6. Increased eye comfort and better work.
7. Attraction of a better class of employees.
8. Improvement of morale because of bright and cheerful working conditions.
9. An eventual increase of production sufficient to at least offset the added lighting cost.

Here are twelve major problems of the textile mill where good illumination brings benefits:

1. *Picking* — Ease and efficiency needed in making machine adjustments.
2. *Card Room*—Card fixers must clean, repair and adjust cards while operators supply picker laps and reunite breaks in the web or sliver.
3. *Drawing Frames*—Quick restoration of breaks or runouts required. Operators must easily locate breaks of separate strands or slivers. Cleanings and roll inspections require uniform top-of-frame illumination.
4. *Slubbing*—Here the entire machine is automatically stopped for piecing up a broken end. If breaks are detected quickly, the broken end is not likely to carry out a number of other ends with it.
5. *Fly Frames*—Do not have automatic stopping mechanisms. Seeing task is critical, and includes mending breaks and keeping bobbins in the creel from running out.
6. *Spinning Frames*—Operators must "touch up" broken ends and keep frames creeled with full bobbins and thread boards clean.
7. *Spooling or Winding*—Extreme visual concentration required to locate loose ends of broken yarn.
8. *Warping*—Warper stops automatically when yarn breaks and until the broken ends are located on the section beam and tied, the flow of work is halted. A critical seeing task.
9. *Slashing*—With a thousand or more of fine yarn strands running, one operator must locate and repair breaks and check the comb for trueness of winding upon loom beams. Important out-of-the-way adjustments, inspections and replacements must be made under the size tank hood, at sides of the slasher, and in the drying cylinders.
10. *Drawing-In*—Requires unrelenting visual concentration.
11. *Weaving* — Several important loom operations, plus adjustments, cleaning, creeling make the weave shed a place for intensive study. Interruptions and defects are the chief objections here.
12. *Inspection and Grading*—Many varying problems will be noticed that offer opportunities for lighting improvement.

General lighting intensities in a textile mill must vary at different levels according to the work performed, and in the intensities of local or supplementary lighting employed. Fine seeing requires the elimination of glare and of shadows caused by operators and projections of machine parts. Also certain units, such as looms, can only be correctly lighted with movable light sources.

To prove the value of the lighting recommended requires the setting up of a reasonably large trial area. Only after operators have worked under the proposed illumination can the improvement in production be determinated.

How to Sell a Shoe Factory

THE manufacturer of shoes has one chief objective—maximum production with the least possible number of flaws or "seconds.' Here then is a distinctly human problem, because of the many tasks in shoemaking that call for fine seeing at hand work or quick seeing at mechanized operations.

So a complete lighting system of correct design may reach a cost approximating 10 per cent of the building value, or 3 to 4 per cent of the capital investment and be justified by:

1. Productivity up 4 or 5 per cent.
2. Better supervision reduces errors.
3. Eye comfort speeds the work.
4. Accidents are fewer.
5. Cheerful working conditions raise morale.

The greatest improvement in production comes in those sections of the plant utilizing hand labor. And in a shoe factory you will probably find about 17 per cent hand labor operations and 83 per cent machine work. So the sales approach is toward increased production with greater safety and less error. This must be centered around—

1. Departments involving such fine-seeing hand work operations as cutting, bench work, stitching, inspection,

Be Modern . . . Put Your OVERHEAD LIGHTING *On Wheels*

with BULL DOG

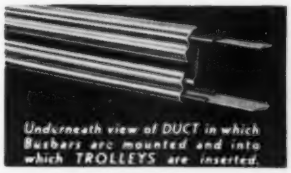
UNIVERSAL TYPE *Trol-E-Duct*

...hting Fixture attach-...to a TROLLEY which ...s as both feeder and ...vable means.

Above photograph shows part of a complete factory overhead lighting system of Bull Dog Universal Trol-E-Duct.

Why not give your clients a modern FLEXIBLE Lighting System which permits them to instantly change the position or increase the number of Lighting units to meet changing working level requirements? Universal Trol-E-Duct—the System of Lights on Wheels—is just such a Flexible Lighting System. Every inch of it is a potential source of current for inserting additional or different Lighting units which, if desired, may then be moved in either direction along the Duct run. What a contrast to the LIMITATIONS and EXPENSE of a FIXED Lighting System!

Write For Illustrated Bulletin



Underneath view of DUCT in which Busbars are mounted and into which TROLLEYS are inserted.

Cross Sectional View, Showing Rolling TROLLEY Inserted in DUCT.

BULL DOG ELECTRIC PRODUCTS COMPANY

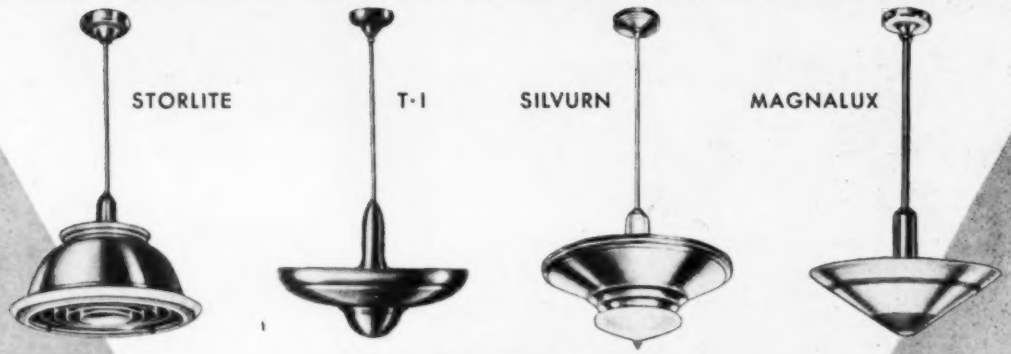
Pioneers of Flexible Electrical Distribution Systems

DETROIT, MICHIGAN

BULL DOG ELECTRIC PRODUCTS OF CANADA, LTD., TORONTO, ONT.

CASH IN ON WESTINGHOUSE

Leader Lighting Lines



COMMERCIAL

INDUSTRIAL

FLOODLIGHTING

WESTINGHOUSE MANUFACTURES THE MOST COMPLETE LINE OF COMMERCIAL, INDUSTRIAL & FLOODLIGHTING EQUIPMENT

LIGHTING COVERAGE

. . . of the Business Market

The "business market" represents a lighting potential that is *twice as great* as the lighting potential of the "residential market!" Today and possibly for many years to come, this will mean the best concentrated opportunity for *light-building sales and service* that is open to Electrical Contractors and Public Utilities.

But light-building sales and service to the business market depend essentially upon the *availability* of Commercial, Industrial and Floodlighting equipment suitable for business applications. The Westinghouse Lighting Division specializes in the manufacture of such equipment . . . is, in fact, the largest manufacturer of lighting equipment specifically designed for the use of business establishments.

Westinghouse Lighting Coverage of the business market means: 1. *Product Coverage* . . . with a complete line that covers all types of Commercial, Industrial and Floodlighting requirements; 2. *Market Coverage* . . . with distribution through a well organized body of Jobbers covering all key centers of business activity; and 3. *Sales Coverage* . . . with representation throughout the business market by Lighting Specialists whose business it is to assist and co-operate with Electrical Contractors and others for the most profitable application of lighting principles.

For complete details on the Westinghouse Leader Lines for Lighting Coverage of the Business Market, call in your nearest Westinghouse Jobber Lighting Specialist; or write direct to Westinghouse Electric & Mfg. Co., Lighting Division, Edgewater Park, Cleveland, Ohio.

WHEN YOU THINK OF *Lighting* THINK OF

Westinghouse

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rounding, sole stitching and fine edge trimming.

2. Mechanized departments, such as skiving and splitting, treeing, welting, rough rounding, perforating, buttonholing, eyeletting, sole rolling, milling and compounding.

3. There are also work areas where rough and medium seeing tasks need good general illumination, but no specially adapted localized lighting.

4. For grading, sorting and inspection operations of better grade leathers and finishes, the introduction of color corrective illumination is desirable.

The principal objective is to work out the most efficient auxiliary lighting means at each machine operation in combination with good general lighting. These applications must reveal a sufficiently improved condition to receive endorsement from skilled workers. If employees report greater ease in performing their work, and demonstrate it in actual production under test or sample lighting, a good part of the battle is won.

It is hardly feasible, however, to work out such a specialized modernization program on paper alone, due to the sizeable investment required for a correctly planned system. Trial units must be installed.

The principal departments of a shoe factory that need good lighting are:

Sole Leather—Leather storage and grading, beam dinkers and last storage.

Uppers—Sorting, trimming, cutting and staying, lining, upper cutting, marking and skiving, and assembling.

Stitching—Lining, tip, closing and staying, boxing, top stitching, button holing and stamping and toe closing

Making — Vamping, welt-bottoming, bottoming, heeling and turning.

The use of light or dark materials in these work areas must be studied before levels of illumination may be established. But a table of such recommended levels for both leather and rubber shoe manufacturing is available in a report of the Illumination Engineering Society, together with recommended lighting layouts for various departments.

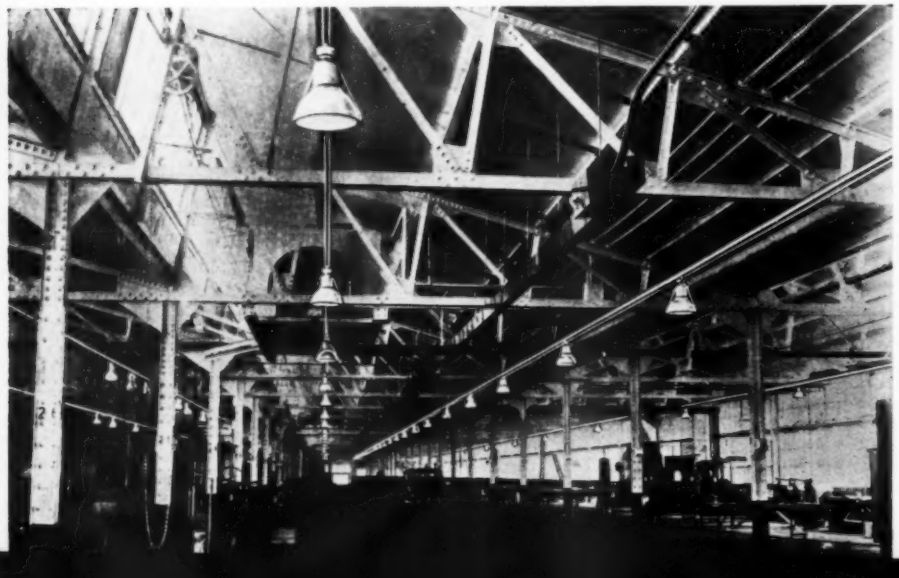
How To Sell Other Industries

EVERY industry has its distinctive management problems, many of which lend themselves to improvement through modernized lighting. But certain basic reasons apply in a broad sense to practically all industries. In approaching an industrial lighting project, therefore, ask yourself these questions:

1. *Production Tasks*—Does the process involve coarse, easily determined operations or is fine-seeing work done that requires close observation?
2. *Quality of Product*—Is production subject to variations in grade, finish or spoilage in some ratio to levels of illumination provided?
3. *Production Volume*—What part of the work-flow or output is most dependent upon good illumination at all times?
4. *Personal Hazards*—Which operations are especially dangerous if poor light, objectionable shadows, glare, or marked contrasts are prevalent?
5. *Employee Turnover*—Are specially trained employees necessary, and would more cheerful working conditions improve their record of continuous service?
6. *Spoilage*—How much of the product is wasted, imperfect or rejected because of errors in production?
7. *Supervision*—To what extent does general efficiency depend upon close supervision, inspection and grading?
8. *Mechanical Processes*—Are human eyes depended upon to prevent spoilage, machine abuse or idle periods in production routine?
9. *Speed of Work*—Are there many fast-moving tasks, where visual concentration is related to important processes?
10. *Seasonal Peaks*—How much extra or overtime work is encountered in departments that normally utilize daylight to some extent?
11. *Sanitation*—Which departments are handling products for which sanitary surroundings are important?
12. *Prestige*—Can this industry show off its facilities to the public by making improvements in lighting?
13. *Safety*—How safely can the premises be patrolled and maintained with its present lighting system?
14. *Wiring System*—Is the lighting equipment being operated in correct locations and with sufficient copper to provide efficient voltage at all outlets?
15. *Economics*—How much is being expended for illumination with respect to the hourly unit costs to operate various machines or departments?

From these general topics it will be seen how a sensible approach can be made regardless of the product or the present illumination standards. For in any kind of industry, certain fundamentals will apply to the correction of such conditions as:

1. Inadequate levels of illumination.
2. Direct glare.
3. Reflected glare.
4. Sharp contrast.
5. Objectionable shadows.
6. Poor directional control or improper distribution.
7. Color discrimination.
8. Incorrect locations, mountings or types of units.



LIGHT ON WHEELS—*Here overhead lighting units are moved on overhead trolley fittings to suit spacing requirements as seeing tasks are varied.*

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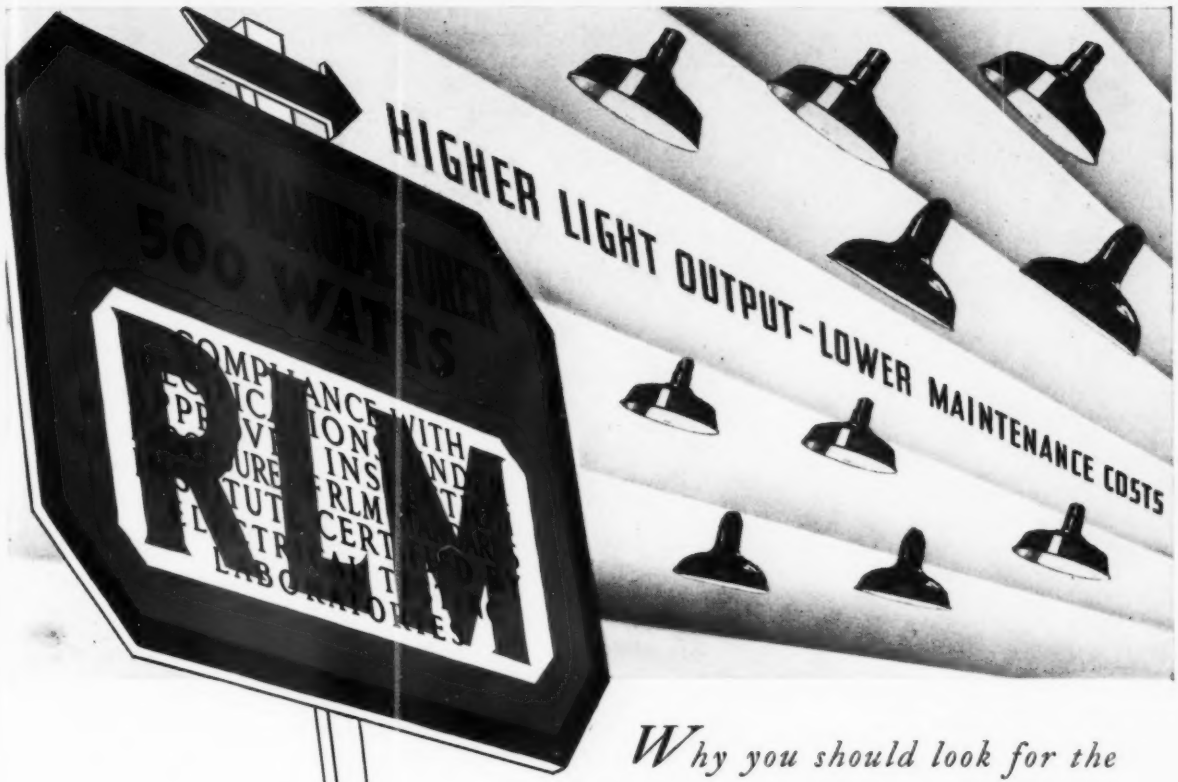

Why you should look for the
RLM LABEL
on your Lighting Equipment

Lighting reflectors may look alike but as with every other type of product they differ as to quality and efficiency. These differences are important, yet usually can only be detected by exacting laboratory and engineering tests not readily available to those who purchase and specify lighting equipment. Therefore, the RLM LABEL!

The RLM LABEL is a certificate of uniform quality and a warranty of conformance to certain high quality standards established by the RLM STANDARDS INSTITUTE. It is the buyers' guide post to higher lighting efficiency and lower operating and maintenance costs!

Basically the RLM LABEL stands for:

1 MORE LIGHT AT NO EXTRA COST
Efficiency specifications are 10-12% higher than average reflector efficiency.

2 BALANCED LIGHTING
Proper distribution and adequate diffusion are just as important as the amount of light. RLM Specification Porcelain Enamel has no known equal as a reflecting surface for Balanced Lighting.

3 LOW REPLACEMENT & MAINTENANCE COST
RLM Specification high quality porcelain enamel is the most durable of all reflecting surfaces. Being easier to clean, maintenance costs are reduced to a minimum.

4 UNIFORM QUALITY
To insure uniformity of quality and conformance to RLM Specifications, inspections and tests are continuously conducted by the Electrical Testing Laboratories of New York, an independent Testing Organization.

ATTENTION
ELECTRICAL CONTRACTORS

Another of the series of advertisements sponsored by the RLM Standards Institute and directed to the individual users of lighting equipment is reproduced here to keep you informed on the work being done in your behalf.

AVAILABLE SOON

Watch for announcement of additional RLM Specifications for Deep Bowl and Symmetrical Angle Reflectors.

For further information about RLM Reflectors and a copy of the RLM Standards Specifications for Dome Reflectors, you are invited to communicate with any of these manufacturers of RLM Standard labeled reflectors. The letters RLM mean Reflector and Lighting Equipment Manufacturers.

ABOLITE REFLECTOR COMPANY
West Lafayette, Ohio

BENJAMIN ELECTRIC MFG. CO.
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OVERBAGH AND AYRES MFG. CO.
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WESTINGHOUSE ELECTRIC AND MFG. COMPANY
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WHEELER REFLECTOR CO.
Boston, Massachusetts

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THE CERTIFICATE OF RLM UNIFORM QUALITY

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The Approach to Store and Office

FROM the engineering aspect, the lighting needs of stores and offices are far more alike than in factories. The store selling exclusive models does not differ greatly from the local butcher in its demands for illumination level and lack of glare. The Twelfth National Bank has the same problems as the X.Y.Z. Importing Company. But there are the enormous distinctions of style, decoration and appearance.

What Stores Need

These ditterences in store lighting arise from the differences in appeal. Does the store cater to regular neighborhood trade, or the casual passer-by? Does the merchant wish to create the appearance of friendly efficiency, subdued elegance, or overwhelming exclusiveness? Although a store seldom falls entirely in one specific group, here is a possible classification—

A: Stores with "Spot" Appeal—

Cigars—Stationery—Drugs

Purchases are made quickly, casually, frequently. A high level of show window illumination is required, with little demand for spots, color or special set-ups. In the interiors, efficient units giving a fairly high level of illumination are most desired. Decoration and extreme diffusion are secondary considerations.

B: Stores with "Acceptance" Appeal—

Grocer—Butcher—Delicatessen

Purchases are made regularly and frequently by the same customers. It calls for an ordinary level of illumination for show windows with little demand for specialties. A fairly high level of interior lighting is desirable, produced by efficient fixtures, not ornate or "dust catchers." Fair diffusion is needed.

C: Stores with "Prestige" Appeal—

Haberdashery—Women's Wear—Shoes

Purchases in these stores are made only occasionally, often by strangers. Show window lighting must be flexible, with emphasis on color, spotlighting and other specialties. The interior lighting should be at least of moderate intensity, frequently of high levels produced by almost any variety of fixture and built-in unit. Efficiency is important but secondary to appearance and comfort.

D: Stores with "Eye" Appeal—

Jeweler—Automobile—Florist

These stores are similar to those of "Prestige" appeal but rely more specifically on the sense of vision. Frequent purchases are rare by the same person. Ordinary and high levels of show window lighting as well as spotlighting and sometimes color are necessary. In the interior, decorative fixtures supplying moderate levels of intensity are preferred with special units for localized areas.

COORDINATED EFFECTS *in architectural lighting for distinctive commercial interiors. The central dome of indirect lighting is flanked with coves and column urns.*

DECORATIVE TREATMENT *with good general lighting. These side-wall indirect troughs break up the blank wall spaces with pleasing highlights.*

Office Requirements

Office lighting is a simpler problem. Adequate illumination is necessary, but since the visual problems of writing and reading are identical everywhere, the required level of lighting is uniform also. Only in reception rooms, private offices and general areas, are lower levels acceptable. But since office surroundings lend themselves more freely to the production of good illumination, we are more ready to pay for diffusion.

Semi-indirect and indirect lighting are becoming the standard, rather than the exception. Light walls and ceilings, easy maintenance conditions, and the freedom from overhead equipment make it possible to equal with indirect equipment the efficiency secured in industrial plants with direct.

At the same time, decoration is not forgotten. Since from the practical standpoint, almost any form of equipment may be used, a wide range of possibilities present themselves. But except in some private offices and reception rooms, the decorative element is subdued yet definite. The lighting becomes an integral part of the room.

The contractor's approach to store and office, therefore, has two steps. First, select and classify your prospects. Then guide them in choosing lighting equipment that pleases them for the decorative standpoint and also provides proper illumination.

Selling with Light

1 BUILT-IN EFFECTS *give a change from conventional lighting. Work in ideas during modernization with lumiline lighting at columns and in recessed ceiling reflectors.*

2 STORE FRONTS *can be made distinctive at reasonable cost, no matter how small. They offer a huge market for contractors in every community.*

3 DISPLAY TECHNIQUE *varies with line, season and styles. Windows should be ready to deliver strong illumination or intriguing high lights as needed.*

4 LIGHT SELLS FOOD *in this market with a row of store-front downlights focused on front-row displays. Other store lighting and outdoor signs support them.*

5 COUNTER ZONES *are factors in the haberdasher's sales. Here continuous louvered units provide spotlights for sales-making.*

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Picking Prospects in Your Town

WITH many stores, offices and factories in town, which ones should you single out to sell? That is the key that opens the door to good lighting business—anywhere.

Even though you know that four out of five factories need better illumination, it is discouraging to start out blind, just calling on people asking—"Want any light?" It is likewise silly. With a little planning, it is possible to call only on people who do need light—and to prove it to them.

Make a Survey

So make an informal survey of your prospects. List the factories in your community. Classify them. Pick out those that probably need light most. List each one on a sheet of paper. Set down the departments and processes in that industry that involve critical seeing tasks, the benefits of good lighting. If you don't know, call in a lamp man.

This done, check over the local factors that may make any plant in a "good" industry, only a fair or even a bad prospect. For example:

Class A—"Untouchables"

Electrical work done by plant electrical force or by another contractor who has given satisfactory service for some time.

Class B—"Hopeless"

Factory not financially able to improve its facilities; or it is having sales troubles in competitive markets; or it makes a product whose demand is decreasing; or its management is backward.

Class C—"Fair" Prospects

Lighting passable but not good, or management not particularly interested but not antagonistic, or business conditions satisfactory.

Class D—"Good" Prospects

Lighting really bad, or new building additions being made, or trouble in production, or management receptive to suggestions when presented.

In making this preliminary appraisal you can support your own knowledge by a little confidential check up, such as

1. *Leads from your local newspaper*—Check building permits, news items of new construction, announcements of new activities, new appointments, new contracts.
2. *Leads from other trades*—Masons, carpenters, plumbers, painters are well acquainted with conditions in your town. They will help if you play fair, by throwing leads to them.
3. *Leads from other electrical people*—Your electrical jobber, the representative of the local power company, the inspector can help. All of them will work with a progressive contractor they can depend on.
4. *Leads from your other jobs*—When you are called in for a motor repair job, the hook-up of a new oven, keep your eyes open, note a poor lighting condition, analyze it in your spare time, and then go to the plant superintendent with a specific suggestion.

Then this being done, systematically call on these selected prospects —so many each week.

1. What Stores Are Best?

The only store in your town that is not a good lighting prospect, is the one which has good lighting. To the retailer, lighting is more than a necessity for seeing—it is a basic form of advertisement. It establishes a class. It creates an environment. Review the types of stores already discussed and classify those which need good lighting.

To determine this, cruise around some evening in your car or on foot. See which stores depend most on evening trade. Compare them with the other stores in that neighborhood and other stores in the same line. Make light-meter readings in the stores and list them to show your prospect how he stands in comparison.

Consider yourself a customer for a while. Does the window display attract you? Is it because of the lighting or in spite of the lighting? Go into the store and make a purchase—a spool of thread, a can of beans, or a box of candy. Are the interior fixtures attractive? Are they definitely old-fashioned?

Study the balance in the lighting. Is there too much contrast between the show window lighting and the interior lighting? Is local lighting needed, such as color matching units, illuminated mirrors, interior directional signs, wall case lighting?

Make your observations, note the facts, study them over after you leave. Put them down clearly on paper and don't forget, when you present your proposal, that the store owner does not want to buy electrical equipment. He is interested only in trade-producing improvements.

***CASE LIGHTING** can be inconspicuous yet effective. Wall and floor cases in every sales area should actively sell.*

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Let Wheeler assist you in planning lighting installations

WHEELER

REFLECTORS

make PLANNED LIGHTING profitable because

When installed in accordance with engineered recommendations, fitted to your specific lighting problems, doubtful results are eliminated.

All industrial lighting problems can be solved by the correct selection and proper installation of good lighting equipment. By Correct Selection, we mean type, shape, size and number of lighting units required. By Proper Installation, we mean scientific placement and spacing of the selected lighting units.

In the design of all Wheeler lighting units, special attention has been given to providing simplified means for—

- installing and wiring
- quick and easy detachment and replacement
- features of interchangeability of reflector types

All of these features mean money in your pocket through savings of time and labor.

WHEELER REFLECTOR CO.
275 CONGRESS ST. BOSTON, MASS.
ATLANTA NEW YORK CLEVELAND TORONTO

You may want advice or assistance on some installation you are now planning. If you do, an experienced Wheeler engineer will be glad to help you. A complete engineering service—including planning, recommendations and blueprint layouts—is at your disposal. In the meantime, we have available a new and very complete Lighting Manual containing a great deal of information that will be helpful to you.

Send for your Lighting Manual today!

WHEELER REFLECTOR COMPANY,
275 Congress St., Boston, Mass.

Please send a copy of your new 200-page LIGHTING MANUAL.

Name ..... Title .....

Company .....

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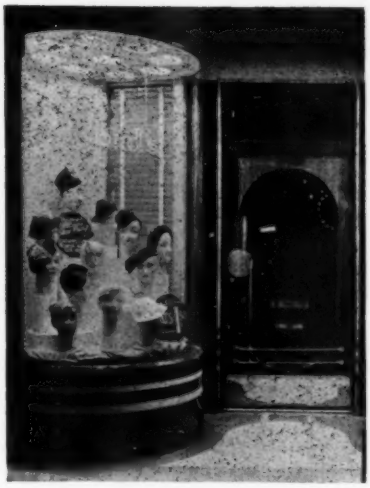
LOW CEILINGS, in this book shop, lend themselves to indirect lighting treatment. Public and private libraries offer similar opportunities.



***SMALL WINDOWS** must hold their place in the shopping zone. Here (with valance removed) high intensities are provided with a center downlight.*

2. Offices That Need Light

Offices are primarily workshops. Well diffused illumination of high intensity is required. Glare must be eliminated. The trend to semi-indirect and indirect lighting for such spaces is noticeable everywhere, because very few physical tasks are as tiring as a long period of clerical or stenographic work under low intensity, glaring illumination.

Of course an office cannot be surveyed as easily as a store without securing permission, but other possibilities remain. Here are a few:

1. Visit the offices of those factories, stores or other concerns with whom you have other business—personal or otherwise. There are lots of excuses which will allow making casual observations.

2. Inspect empty suites in office buildings. Perhaps you can convince the building management that a good lighting installation would make it more rentable.

3. Try "cold canvass"—asking permission for a chance to analyze conditions and make a recommendation. If the call is preceded by a letter, it will be more certain. Address the president, office manager, or the owner by name.

4. And while you are about it—see if the lighting in your own office or store makes you a good prospect. You should set a good example. The best way to make your neighbors *want* good lighting is to make your office and store lighting attractive and efficient.

This Equipment Will Help You Sell

HAVING picked out certain factories, offices, or stores as logical prospects for improved lighting, what technical information and equipment will help in selling? There are a number of such tools available that will make the job a lot easier.

1. A Portfolio of Pictures

As a contractor, your main interest is the wiring work. But this is least important from the viewpoint of your prospect. The lighting unit is tangible to him. So, talk in terms of the lighting unit and the better seeing or improved appearance it will provide.

Also, have no axe to grind for any one manufacturer of lighting equipment. The jobbers with whom you deal probably handle several lines, with direct, semi-indirect, and indirect units in a variety of shapes and types. So after you study the needs of a particular prospect, pick out a few units that you want to recommend—never more than two for an industrial job, three to five for a commercial job. Assemble pictures of them in a binder, together with pictures of installations using them.

Never throw a half dozen catalogues on a prospect's desk and say "Help yourself!" You are trying to *create* a sale. An easy way to prepare the "show books" is to use loose leaf sheets—one fixture per page, one installation picture per page. Keep these on file in your office. When you are ready to sell a job, pick out those sheets that present your best judgment.

Have pictures of large installations and small ones. Don't try a picture of Marshall Field's or Macy's to sell a 15′ by 35′ grocery store. And if possible show some local pictures—your own jobs.

2. Trial Installation Units

Be ready to make a trial installation, especially for industrial or office prospects. The best trial installation is four units. One unit is seldom enough, unless appearance is the only thing in question. Don't leave trial units in too long. A few days—at most a week—should be sufficient. The reaction to the former poor lighting *after the trial units are removed and the old units replaced* is often the clinching sales argument.

Keep a small stock of units on hand for trial purposes.

The jobber, the manufacturer's representative, sometimes the local utility, will work with you on these trial installations, if you work with them.

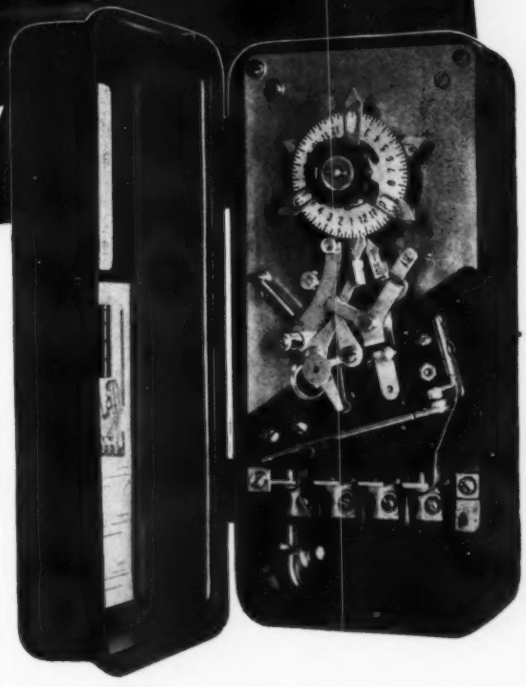
Curtis Lighting Photo

. . . that makes this installation

COMPLETELY AUTOMATIC

With Fall business promising to be the best in years for retail merchants, alert Electrical Contractors too, will cash in by going after window lighting installations.

But . . . you must first sell these merchants the idea that evening lighting will help increase their sales. And to cinch your selling, suggest the Unseen Hand. Your wholesaler handles the complete line of Sangamo Time-Switches.



Sangamo Form K—a sturdy time-switch with simple mechanism and silver contacts. Can be operated manually without affecting subsequent automatic operations.

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

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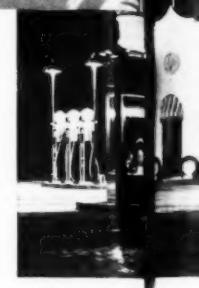
BENJAMIN
TRADE MARK

Industrial Lighting. Illustrated on this page are three of the scores of recent Benjamin lighting developments. Above, the Benjamin high intensity vapor installation in assembly department of a nationally known radio manufacturer. Mounted 9 feet high, spaced 8 ft. by 8 ft., Benjamin Glassteel Diffusers No. 7203 Mercury Vapor type alternated with 500 Watt Incandescent type produce an average of 80 foot-candles of blended, mercury-incandescent light.



Service Station Ljamin flectors heade in D able inner refl shap the building s the for proper hi e pu

Skylight Reflector, a typical Benjamin development in the field of Specific Location Lighting. Provides a luminous ceiling of artificial light. Specifically designed for operations and inspection work involving shiny surface materials, such as printers type, chromium, nickel and other plated objects. Also, for operations involving close, exacting workmanship. Together, these 36″ x 28″ units light large areas.

Benjamin Floor Service Turnlox. Another advance in safer and lower cost maintenance of lighting equipment. Turnlox (below) made possible removal of reflector and lamp as unit for easy cleaning *on the floor*. Now comes the Benjamin Floor Service Turnlox to make possible safe, easy removal of unit *from the floor*. (See illustration at right.)

This optional feature is available at slight additional cost on many Benjamin Turnlox Reflectors. Also available are Floor Service Turnlox hoods to convert regular type Turnlox equipment into Floor Service Turnlox.

MASTER *for large signs* **EMBLEM** *for circular signs* **REXIDE** *for square signs*

Sign Lighting requirements can be grouped into six broad classifications. A specially designed reflector is required to provide the right kind of light for each classification. That is why Benjamin lighting engineers have developed 6 types of sign lighting reflectors, three of which are illustrated (left).

UMI

N IS THE NAME FOR LIGHTING

for Industrial...Gasoline Service Station...Sports...Sign Lighting and Floodlighting, the name BENJAMIN stands for Leadership.

ation Ljamin includes a complete range of floodlight re- headed in Duo-Service Floodlight. Its patented, adjust- er refle shaped porcelain enamel outer reflector spotlights ding a the grounds. Also, the Benjamin Column-Lite er hig e pump island.

Sports Field Lighting, a development in which Benjamin has had an outstanding part. To meet every floodlighting requirement, Benjamin has engineered and developed a complete floodlight line including Benjamin Ellipto-Lite, Play-Area, Elliptical Angle, Duo-Service and Utility Floodlights. It's never too late in any sports season, to sell and install Benjamin Floodlighting.

BENJAMIN
500 WATT
COMPLIANCE WITH SPECIFICATIONS UNDER APPROVED INSPECTION PROCEDURE OF REMSTANDARD-INSTITUTE CERTIFIED BY ELECTRICAL TESTING LABORATORIES

The RLM Label on Benjamin Dome Reflectors typifies the high and uniform standards of quality to which all Benjamin Equipment is manufactured.

Hazardous Location Lighting is a special field for which Benjamin has engineered scores of vapor and explosion proof fixtures which fully meet Underwriters' Laboratories specifications.

BENJAMIN WINS! More Lighting Specifications call for Benjamin. More architects and industrial men specify Benjamin, more electrical contractors buy Benjamin. It's good business to have Benjamin Catalog No. 26 at your elbow. Issued by the world leader in industrial lighting, it is the most complete, easy to use, compendium of industrial lighting and floodlighting information. If you do not now have a copy, use the coupon below.

CATALOG 26

ilvered Lamp Diffuser, a new Benjamin development which rovides a specially designed reflector for the new silvered owl lamp. Minimizes glare, produces a more diffused light, romoting quick-seeing, eliminating eye strain fatigue.

BENJAMIN ELECTRIC MFG. CO., Des Plaines, Illinois

I can use the 365 pages of lighting reflector information contained in Catalog 26—Mail me a copy.

Name.....

Address.....

City..... State.....

UMI

HERWIG

OUT-DOOR
LIGHTING FIXTURES

Apartment Buildings
Public Buildings
Bungalows
Churches
Schools
Garages
Country Clubs
Warehouses
Residences

A FIXTURE FOR EVERY
OUTDOOR PURPOSE
Cast Iron or Bronze
Send for our
Catalogue No. 40
200 Illustrations

The
Herwig Company
MANUFACTURERS
Established 1908
1753-59 Sedgwick Street
Chicago, Illinois, U. S. A.

Modern Numbers Shown on P. 4 & 5
—Also Furnished in Cast Aluminum
—Polished or Satin Finish

LIGHTING EQUIPMENT
MANUFACTURERS

Every issue of

ELECTRICAL
CONTRACTING

contains a department

"BETTER LIGHTING"

as well as feature articles and other material dealing with lighting problems

Use the advertising pages of Electrical Contracting to sell 15,000 big buyers of lighting equipment

ABC A McGRAW-HILL PUBLICATION ABP
330 W. 42 St., New York

3. Instruments for Checking

Have a lightmeter and voltmeter ready for every occasion. Lightmeters today are accurate, easily read and understood. There is no mystery in the foot-candle. It is merely a measure of the level of lighting intensity. The pointer indicates the condition and the reading can be interpreted quickly to the average customer.

To a contractor, voltmeters are "old stuff." But when voltage is down four per cent the brilliance of lamps is down fifteen per cent. Why buy a new attractive fixture with a larger lamp, if voltage variations and voltage drop make it less effective than the former unit?

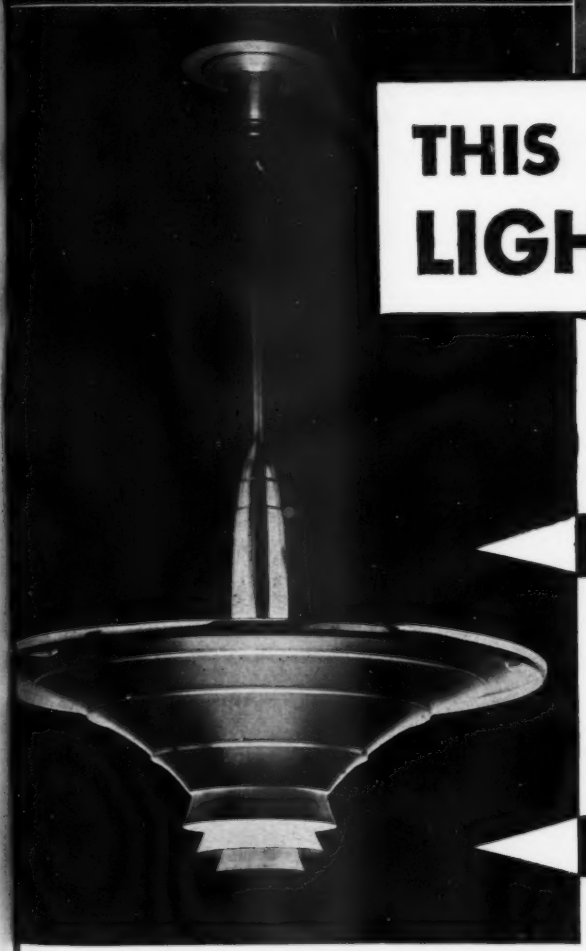
***DELUXE INTERIORS** give lots of latitude to the contractor. This art gallery used recessed panels and reflectors to provide a touch of modernism.*

***SCHOOL LIGHTING** today means eye conservation. New standards of comfort for school children are selling better illumination everywhere.*

4. A Schedule of Lighting Intensities

Don't take it upon yourself to prove that five foot-candles is not enough for a particular job. Use the tables of foot-candle intensities prepared by the Illuminating Engineering Society. These are industry standards. These tables with equivalent "watts per sq. ft." values are presented in the "Handbook of Interior Wiring Design." Keep them in your portfolio of units and installations. See condensed table on page 130.

THIS STORE IS *Completely* LIGHT-CONDITIONED



NEW CURTIS LUMINAIRES PROVIDE 2-WAY LIGHTING FROM ONE LIGHT SOURCE

INDIRECT *lighting for "eye comfort"*

Seeing efficiency in a store . . . for customers and salespersons . . . is maximum under Curtis adequate indirect lighting. The glareless, evenly diffused qualities of indirect lighting make seeing easy, quick, accurate . . . provide a cheerful, progressive store atmosphere. In addition to general indirect lighting this attractive luminaire equipped with ONE lamp gives

DIRECT *lighting for "plus" selling*

High intensity direct lighting, properly controlled and concentrated on the selling area, is a business stimulator . . . attracts attention by adding sparkle and brilliance to merchandise . . . inspires impulse buying.

"EDGE-MONT"

Patented "Edge-Ray" ring, self-illuminated bowl
Bowl: Made of Lunax Aluminum, finished Lustrous Aluminum
Control Louvers: Made of Steel, painted Mat Gray
750 to 1500 Watts Cat. No. 1280; 500 Watts Cat. No. 1260

MAIL THE COUPON

for complete specifications on "Edge-Mont" and other Curtis "Ferree-Rand" direct-indirect luminaires
(Manufactured under U. S. Patents Nos 1,906,559 and 1,894,583)

Curtis Lighting, Inc.

1123 West Jackson Blvd., Chicago

I am interested in this new "boon" for merchandising with light . . . Send me the details on Curtis "Ferree-Rand" direct-indirect luminaires.

Name.....
Company.....
City.....State.....

UMI

A Profit For You in Every Sale

Type L-35
100-watt

Type L-36
200-watt

Type L-49
300/500-watt

Type L-43
750/1000-watt

Type L-45
300/1500-watt

Form 92

Type L-48
1500-watt

SALES of these floodlights will bring profits to you from the sale of wiring supplies, brackets, poles, switches, and labor, in addition to that from the projectors themselves. Moreover, satisfied customers will remember you when placing future orders.

The Handy floodlights, L-35 and L-36, are ideal for all small-area lighting jobs. Weather-proof, sturdy, and portable, they will satisfy countless requirements.

The L-49 and L-43, big brothers of the Handies, fill most of the larger floodlighting requirements. The variety of mountings makes effective applications easy.

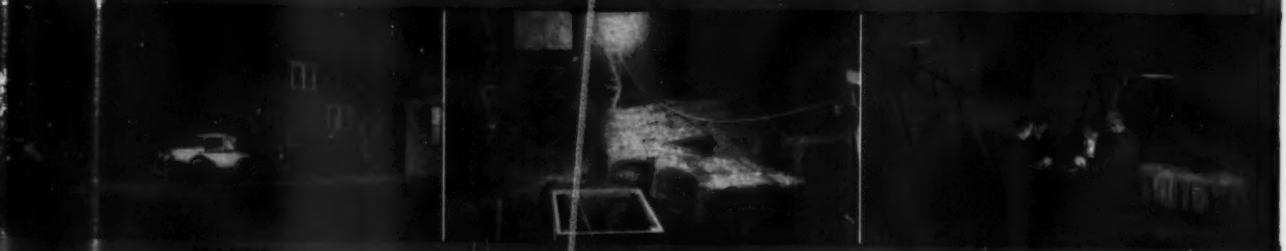
The L-45 and Form 92 are just the units to light the filling station adequately, the L-45 to light the driveways and building front, and the new Form 92 the pump areas.

The L-48 is first choice for sports lighting. Efficient and inexpensive, this floodlight should now be in great demand by schools in your territory for night football practice.

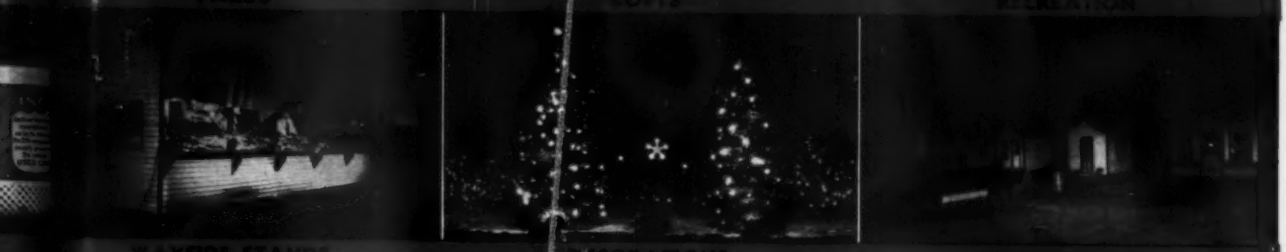
General Electric has equipment for every outdoor-lighting application. Illustrated is the general utility line. A line of copper and cast-aluminum floodlights for permanent installations and heavy-duty service, and underwater floodlights for swimming pools and fountains, is also available.

General Electric lighting specialists will be glad to help you with lighting recommendations for any installation by furnishing suggested layouts. For further information concerning G-E floodlights, or for the services of a specialist, call the nearest G-E sales office or branch of the G-E Supply Corporation, or write General Electric, Schenectady, N. Y.

AVE COUNTLESS USES



YARDS LOFTS RECREATION



WAYSIDE STANDS DECORATIONS TOURIST CAMPS

FACTORIES REAL ESTATE RIFLE RANGES

THEATRICALS CONSTRUCTION TRAPSHOOTING

SOFTBALL FOOTBALL HOCKEY

HORSESHOES TENNIS

E L E C T R I C

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OAMCO REFLECTORS

—THE LINE THAT OPENS MANY OPPORTUNITIES FOR LIGHTING INSTALLATIONS

Glassteel Diffusers

Threaded Type

Reflectors are made of steel and porcelain enameled white outside and inside. Some of the light is reflected against the ceiling through the apertures in the top of the reflector. This eliminates the contrast between a dark ceiling and a well lighted working plane.

Hoods are white porcelain enameled with medium or mogul sockets; they are either pendent type with fitting tapped for ½ inch conduit or with cover for 4 inch outlet box.

Weatherproof Bracket Fixtures

Weatherproof Bracket Fixtures wired complete—½ inch conduit bracket—porcelain enamel reflector—finished green outside, white inside. Packed one to a carton. Listed by Underwriters Laboratories, Inc.

RLM Standard Dome Reflectors

Tested and certified to conform with the specifications of the RLM Standards Institute. Made in 5 sizes for general indoor and outdoor use. Outside green, reflecting side white.

The OAMCO line is receiving contractor approval everywhere. Write for details.

OVERBAGH & AYRES MFG. CO.

411 S. CLINTON ST. CHICAGO, ILL.

DONGAN
Pole Top Mercury Lamp
TRANSFORMER

Mercury Vapor the economy light for floodlighting.

The Dongan Pole Top Transformer presents a new method of reaping profits from Mercury Lamps.

Any standard make of reflector with pole top bracket will fit this new type of Dongan Transformer.

- Easy to install.
- Wiring fully enclosed.
- Makes 110 volts available for Mazda lighting of small signs on the side of the pole.
- Dongan built—Quality.

Ask your Electrical Wholesaler or write for prices. Dongan makes a full line of Mercury Lamp Transformers. Also complete lines for Machine Lighting, Signaling, A. C. Arc Welders, Bell Ringers, Electrical Testing, Pipe Thawing . . . Transformers for Neon Signs and Oil Burner Ignition.

"The Dongan Line Since 1909"

DONGAN ELECTRIC MFG. CO.

2985 Franklin Street - - - DETROIT, MICH.

5. Demonstrations

Certain basic ideas properly demonstrated, have far-reaching results. It is worth while using a bit of showmanship to get these ideas over. It can be done with this simple demonstration equipment that any contractor can carry with him in his car to any lighting prospect.

1. *To Show the Right Intensity—*

Connect a rheostat to a lighting unit over an assembly table or machine operation or to a portable lamp in an office. Have the worker adjust for himself the amount of light that is most satisfactory, by sliding the rheostat handle.

If care is taken to avoid glare, almost invariably the intensity selected is at least as high as those listed in illumination tables and far greater than the existing levels of the installation you are trying to improve. This substantiates your recommendation.

2. *To Show How Cleanliness Helps—*

Prove the value of regular cleaning of lighting equipment. Use a small reflector with a 25 or 40 watt lamp. Note the reading on a light meter at a few feet. Then smear the reflector and lamp with coal dust or lamp black. Note the big decrease in foot candles.

3. *To Show the Effect of Painting—*

A wooden box about 6 by 6 by 8 inches will show the effect of clean, light-colored paint. Place a socket in the center, and a small lamp. Have a hole in the box the size of the light-meter cell. Paint the inside of the box a good white. Note the meter reading. Then thumb-tack grey paper on the inside of the box. Note the difference in foot candles.

4. *To Show the Effect of Voltage—*

Use the same box to justify your recommendations of heavier copper or divided circuits to correct low voltage. Screw in a lamp of proper voltage, then one of the same size five volts higher, then ten volts higher. The loss in light each time will be astonishing.

Or better yet—use the rheostat mentioned, leave the lamp fixed, and actually drop the voltage five and ten volts. The effect, is the same, although this latter method exactly duplicates the condition you are trying to correct, and is more impressive.

Adopt all these devices for demonstrating as your standard equipment. Have them in your car, in a carrying case, ready to use on every prospect. See how much faster, easier and more profitable the selling becomes.

QUAD

THIS COMPLETE LINE FOR INDOOR AND OUTDOOR INDUSTRIAL AND COMMERCIAL LIGHTING

★ **IS MODERN IN EVERY DETAIL**
★ **IS RECOGNIZED FOR EFFICIENCY**
★ **INCREASES LIGHTING SALES**
★ **MEANS BETTER LIGHTING PROFITS**

The Quad line is backed by years of experience. The units featured and many others are all modern in design, representing the latest in lighting efficiency.

Besides demonstrating great illuminating value in thousands of installations, Quad units have also demonstrated to contractors everywhere that they are in demand —that they satisfy—and that they do build sales. Investigate now!

DUPLEX DOME

Illuminates the upper walls and ceiling with diffused light and delivers direct light downward. Louvers formed in the metal walls of the reflectors divert sufficient light upward to relieve unpleasant contrast between the bright reflector and dark background. The white porcelain enameled exterior of the reflector and supporting stem are also illuminated. Made in the standard ½" socket type and with heavy threaded hoods (¾" if specified).

★

QUADRANGLE MFG. CO.
32 S. PEORIA ST.
CHICAGO, ILL.

Post Top Reflectors
Designed for the general illumination of outdoor locations where a practical fixture of good appearance is important. The unit consists of a green porcelain enameled reflector white inside, with ornamental knob, attached to an urn shaped cast aluminum socket housing by means of heavy cadmium plated iron rods. Three sizes of reflectors accommodate lamps from 200 watts to 1500 watt capacity.

Long Beam Floodlight
Enclosed-wiring floodlights for both single and multiple mounting. One-light units fit over 1½ and 2 in. pipe while multiple fit over the end of 2 inch pipe. Cast aluminum brackets have wiring space with removable cover and each with reflector may be adjusted through 180 degrees horizontally and tilted 20 degrees up or down from the normal vertical position. Beam projectors are removable and interchangeable.

...e Reflector for Mercury Vapor
...rcelain enameled green outside ...hite inside. Designed for the 400 ...att high intensity mercury vapor ...amp. Recommended for general ...ndustrial illumination. Its wide ...distribution characteristics combined with the shielding effect of the deep skirted reflector and opal glass diffusing ring make this a most practical unit for comparatively low mounting.

...per Proof Fixtures & Reflectors
...f standard construction comprising a green enameled cast iron threaded body, a clear glass globe with threaded neck and a green porcelain enameled reflector. Three body styles include, ¾" horizontal, ¾" vertical, and outlet box types in both medium and mogul sizes. Four types of reflectors are offered.

UMI

SMALL OFFICES *require careful treatment to insure comfortable seeing conditions in every corner, no matter how crowded.*

Building Up Your Case

IT is what you do when you get in that makes the sale. And what you should do depends on present lighting conditions. But there is one thought that should always be in mind. You are not in this factory or this store or office just looking for a job—*Keep your objective clear!*

Here's what you are looking for—

In the Factory: Ways to help toward Increased Production, Reduced Spoilage, Greater Safety, Improved Morale, Lower Labor Turnover.

In the Office: Chances to effect Faster Work, Fewer Errors, More Pleasant Surroundings.

In the Store: Improvements that will bring Greater Advertisement, Quicker Sales, Fewer Exchanges and Dissatisfied Customers.

It is only when you can recommend lighting changes that will specifically contribute some of these customer benefits, that you are entitled to the business and can expect to make a sale. But this is not hard, if you go about it with a bit of common sense, a little care and honest pains, and intelligent preparation. Here are a few things to do in building up your case:

1. Study the case sheet you have made out for this prospect, that lists the reasons why they need good lighting.

2. Prepare your portfolio to include both the data you will need on that job and the photographs and data you will want to show your prospect.

3. Check over the premises, listing the foot candles provided by the present lighting for the important departments or processes or machines or counters or office operations. Remember that good lighting is not just a matter of sufficient illumination alone. It also means adequate diffusion, freedom from direct or reflected glare, freedom from harsh shadows, proper color value, proper direction of light. Note these factors too.

4. Study the suitability of present equipment as to size, style, intensity, distribution and glare, the location of present units, their condition and appearance and the color of lighting provided. Note all that.

5. Observe the cleanliness of walls and ceilings and note where repainting with a lighter color or regular cleaning maintenance is needed.

6. Test for voltage conditions on the system and list improvements needed to relieve overload or other defects and what will be accomplished.

7. Gather comments from the workers, at critical seeing points, as to troubles over spoilage, headache and other effects of eye strain, to determine where trial units might be installed.

8. In stores, find where customers complain in color matching, what counters have proved most effective in stopping passing patrons.

9. And finally dictate a brief 1-2-3-4 statement of these conditions, as you have found them, and make your recommendations.

10. If any of these suggestions sound difficult, read one or more of the lighting handbooks mentioned on the first page of this section. Study the manufacturer's equipment catalogs and be familiar with the units available for every need. It will be no trick at all to prepare yourself to make such practical surveys of factory, store or office conditions.

OFFICE WORKERS *who enjoy a cheerfully lighted atmosphere like this pay dividends to their employers in accuracy, efficiency and freedom from strain.*

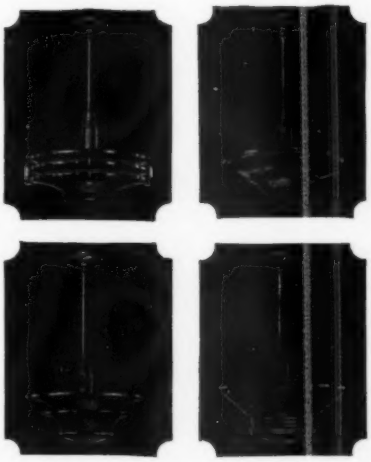
UMI

Announcing 1937 "Lighting All-Stars"

Contractors' 1937 All-American Commercial Lighting Team

1937 All-Star Eleven:

1. Optilux
2. Super-Illuminator
3. York
4. Direct-Indirect
5. Louvre-Lens
6. Utility-Lite
7. Public Service Lite
8. Yorkleigh
9. Concealed-Indirect
10. Guthfan
11. Lumozak



Power and Punch: Majority of lighting sales are originated and sold by *you,* Mr. Contractor! Punch and power of products you offer must be delivered forcefully. Guth's fully-complete and well-designed line offers *you,* the punch and power *you* require.

Finishing Smoothness: In football, finishing smoothness and team-play make championship calibre. In Guth lighting, ALZAK Aluminum and Porcelain Enameled Steel reflectors, render that smoothness to *more sales.* And team-play — yes — our engineering department wants to aid you in your layouts and recommendations!

Speed and Stamina: National distribution to aid you, Mr. Contractor, speeds our service to you. Factory stock shipments are made to accommodate your needs. And, stamina — we believe we are reliable, dependable — let's play this game *together.*

The EDWIN F. Guth COMPANY ST. LOUIS, MO.

The Edwin F. Guth Co.,
2615 Washington Ave.,
St. Louis, Mo.

Count us in as a booster of your "1937 Lighting All-Stars." Send us catalogs and prices.

My name is_____

My firm is_____

Address_____

City_____

UMI

Presenting Your Proposal

LIGHT YARDS—*This lighted conveyor structure in a gravel plant, simplifies maintenance and reduces accidents to night-shift workers. Many yards need light.*

EVERY prospect wants to know first what is wrong with his present lighting. Tell him—but in his own language. Don't just call units obsolete or insufficient,. Do this—

1. Translate the present conditions into light meter readings that show the intensity now provided at all parts of his factory, store or office.

2. Show what relation there may be to production or spoilage or sales or customers or employee complaints with conditions in the various departments.

3. Then list the improvements that should and can be made and what benefits should result from it.

4. Then explain what you recommend —re-location of present units, and replacement of units and auixilary equipment that will be needed.

5. Show what changes this will involve in the wiring system.

6. Bring out your portfolio of photographs and show the prospect good pictures of the units you recommend and other impressive pictures of installations of that unit in similar service in other plants or stores or offices.

7. Suggest a specific trial installation which you will set up to check your recommended improvements, the carrying out of the contract to be dependent on the judgment of the workers, foremen and the prospect.

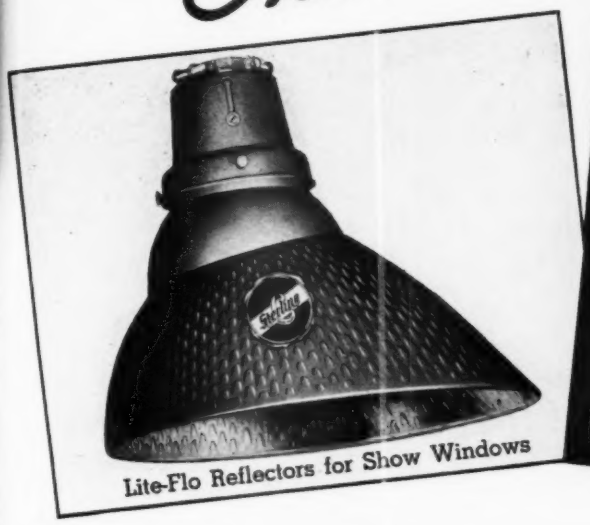
Up to this point you will be talking entirely in terms of lighting conditions

LIGHT
the Job
WITH
Localite
Specialized
Engineered
UNITS FOR
EVERY
LOCALIZED
LIGHTING
NEED
FLEXIBLE
Fostoria
LOCALITE
FOSTORIA
Announces
'CANOPY' LIGHTING UNITS
Wherever reflected glare is a problem, the new Fostoria Canopy Lighting Unit provides completely diffused, high intensity illumination. For such tasks as bright metal scribing, drafting, typesetting, engraving, polishing, hard candy mixing, minute inspection work, etc. A complete variety of models is available for specific applications. Full information will be furnished promptly on request.
DESCRIPTIVE BROCHURE FREE... A valuable handbook of localized lighting.
THE FOSTORIA PRESSED STEEL CORP., FOSTORIA, O.

Points to Cover

1. Defects in Present Lighting
2. Re-location of Units
3. Replacement Equipment Needed
4. Auxiliary Equipment Needed
5. Wiring Changes Necessary
6. Cost of the Job
7. Cost of Operating the Improved Installation
8. Time Necessary to Do the Work
9. Interference with Normal Routine
10. Summary of Results to Be Expected

Sterling Extra Lighting Value



Lite-Flo Reflectors for Show Windows

Ster-Lite Fixtures for Interiors

Adds the Contract Closing Punch!

A powerful aid to contractor leadership in the swing to modernized commercial lighting is the extensive *Sterling* Line of Reflectors and Fixtures.

***Sterling* FRONT-LINE Lighting, made possible by Lite-Flo Reflectors, is sweeping the country. Hundreds of installations in leading stores have demonstrated an unbelievable increase in lighting effectiveness using the same lamps—with no increase in operating cost.**

New standards of beauty and efficiency in interior lighting are made possible by revolutionary improvements afforded by Ster-Lite Fixtures.

For display lighting—for case lighting—for commercial interiors—whatever your commercial lighting problem, the *Sterling* Line has the answer—the last word in modern effects, plus high efficiency.

Furthermore, *Sterling* Representatives will gladly work with you—furnish up-to-the-minute layouts based on sound engineering and broad, practical experience.

The modern *Sterling* Line is the key to more lighting contracts. Write for catalogs and complete details. Just mail the coupon.

Reflector & Illuminating Co.
1435 W. Hubbard St., Chicago

Without obligation to us please:

- ☐ Send Literature on Lite-Flo Reflectors
- ☐ Send Literature on Ster-Lite Fixtures
- ☐ Ask Sterling Representative to Call

Name.....

Address.....

.....

Sterling Reflectors

The Choice of Leading Merchants

The Best Lighting

is profitable in the factory
is necessary in the office
is demanded in the assembly hall
is humanitarian in the class room
is desirable in the home

You will want full information on the Multi complete line of Industrial and Commercial Lighting Equipment. Ask for information on our many new units, Multi "Screw Lock" line of detachable diffusers and reflectors, vaporproof fixtures, open and enclosed outdoor floodlights.

PORCELAIN ENAMELED REFLECTORS of all types and sizes—MULTI has the reflector you need. It will do the job better. Less than the best light is not good enough.

MULTI ELECTRICAL MFG. CO.
1840 W. 14th Street CHICAGO, ILLINOIS

McGILL
Levolier
SWITCHES carry on year after year, faithful as the falls, seemingly forever. This is because they are made that way—simple, rugged, durable. Made in complete range . . . 3 to 10 Amp., also special switches. Stocked by recognized wholesalers everywhere.
McGILL MANUFACTURING COMPANY
Electrical Specialties of Quality
VALPARAISO, IND.
Box 670

and their effect on the prospect's business. Now you come to the matter of costs. Handle this in the same plain straightforward way—

8. List the elements of cost and state the total. Then express that total in terms of the monthly charge that will appear on the prospect's books, if the plant improvement is amortized over one year. He knows it but he will not think of it unless you bring it up.

9. Estimate the increase or decrease that may be expected in the cost of operating the improved lighting system. Balance this against the profit benefits that will result from increased production, reduced waste of time and materials, machine breakage, errors, low employee morale, customer complaints or other of the high costs of poor light—to suit the case.

10. State the time necessary to do the work and the interference with the prospect's normal routine involved.

11. Summarize the results expected.

12. Hand the customer your fountain pen and get his signature.

Don't Be Afraid

Of course, the prospect may not sign right then. He probably will want to study your proposal, discuss it with others in his company. His answer may be "no" that day and "yes" three months from then. Don't be afraid. Figure your price with care—then stick to it. Lighting is a necessity. Better lighting is an investment that pays for itself in added profits.

And be fair with your customer. Do not recommend minimum changes called for by the Code. Consider location of switches, over current protection, feeders, branch circuits and the need for convenience and auxiliary equipment. While he is changing his lighting, help him to do it right, for a good job pays better than a poor one.

And use the manufacturers, the wholesalers and the lamp men. They will be eager to cooperate. They can help you greatly in organizing yourself to do a creative job in building up your lighting business. Call them in and work it out together.

Similarly the cost of operation should be presented. Lamp life, current cost, maintenance, depreciation, and investment are easily calculated. Again, be fair. If this analysis is omitted the prospect will make his own, with no credit to yourself. Put it in terms of cents per hour or dollars per day. Five or ten cents per hour per unit is small compared to the payroll of those who depend on it.

"Can you answer their questions on MERCURY VAPOR LIGHTING?"

"YOU CAN WHEN YOU HAVE THIS *New* GOODRICH CATALOG . . . . . *Write for It TODAY!*"

Advises **SUNNY LUMENS,** *the Goodrich Reflexpert*

● They're asking about it for industrial plants . . . for inspection departments . . . for outdoor lighting . . . for gasoline service stations—everywhere, mercury vapor illumination is attracting attention. Are you prepared to advise your customers? Are you taking advantage of this new sales opportunity?

In this special new catalog, Goodrich takes the mystery out of mercury vapor installations—makes it easy for you to understand—offers a complete line of equipment to answer practically any requirement for indoor or outdoor illumination with mercury vapor lamps. Your name and address on a penny post card is all it takes to get this 32-page catalog.

This new Goodrich catalog is complete with descriptive matter, light distribution curves, engineering data, etc. It will help you plan and sell your mercury vapor equipment for indoor and outdoor installations. Where shall we send your copy?

ASK FOR YOUR FREE COPY OF CATALOG NUMBER 81

GOODRICH
ELECTRIC COMPANY

OFFICES IN ALL PRINCIPAL CITIES

GENERAL OFFICES & FACTORY, 2902 NORTH OAKLEY AVENUE, CHICAGO, ILLINOIS

UMI

Extra

Profits From Specialty Lighting

ACCENTING ARCHITECTURE *with tasteful light treatment opens a big field. Here ingenious placing of floods in urns and below grills produced intriguing and appealing effects.*

EVEN though available lighting sales to the factory, office, and store should be enough to challenge the interest of any wide awake contractor, other special lighting applications offer good profits too. The whole field of outdoor lighting is rich in opportunities.

Outdoor lighting means more than the formal floodlighting of important buildings for advertisement. Only recently, a large manufacturer of a complete line listed his unit floodlight sales for their other applications. The following all ranked ahead of formal floodlighting:

1. Sports Areas
2. Industrial Yards and Work Areas
3. Service Stations
4. Swimming Pools and Beaches
5. Parking and Used Car Lots
6. Protective Floodlighting
7. Construction Projects

Many sales in these fields are initiated by the contractor, many more than the formal floodlighting sales. And after all, a 1000 watt open flood or light weight unit may cost only a fraction of the same size heavy duty enclosed job, yet the wiring layout is the same. The contractor has proportionately more profit in these miscellaneous fields than any one else in the industry.

Once more the stimulation of outdoor lighting depends on establishing contacts and presenting facts.

NIGHT SPORTS *present increasing opportunities as more athletic fields are fitted for after dark football, softball and other games.*

1. How to Sell Sportslighting

The sports areas most frequently lighted are golf driving ranges, tennis courts, fields for softball, baseball, and football, and swimming pools. The order of importance varies in every section. You must judge this for yourself. Some of these are private projects for residences and clubs. Some are public. either county or municipal. Some are commercial, built for spectators or rental.

Commercial projects can have only one type of appeal. The lighting equipment must furnish a means of increasing attendance at baseball, football or whatever it is. Or it must extend the participating time of paying customers for golf, driving or swimming pools. In approaching note these points—

Baseball: Do the customers come from a limited area, so that the number of people free in the afternoons is relatively small?

Football: Does a Saturday afternoon college or school game offer too much competition for a semi-pro game at the same time?

In other words, income must increase over and above enlarged expenses. Quite generally it does.

The Most Economical of All Time Switches

Lower Initial Cost
Lower Installation Cost
NO Servicing Costs

The New Paragon G 15

SIMPLICITY OF INSTALLATION — only three convenient terminals to connect — five assorted pushouts for conduit connections. Plenty of working room — luminous interior.

SIMPLICITY OF ADJUSTMENT — two knurled thumb knobs release or lock the 24-hour "clear-line" dial and trippers. No tools needed.

SIMPLICITY OF OPERATION — powerful, slow-speed, self-starting synchronous clock motor, self lubricating — four gear clock train — needs NO SERVICING. Positive "star-wheel" control of snap action silver button contactor switch — trouble free. 2 to 6 switching operations daily.

Waterproof, dustproof and tamperproof cases of seamless 16 gauge steel.

Initial Installation Cost Is Final Cost

For reputation-building dependability, install Paragon Time Controls — made by the largest exclusive time switch designers and builders in the country.

Write for Bulletin A 3743, with prices and discounts.

Paragon Electric Co.

37 W. Van Buren St. CHICAGO, Ill.

Factory
Manitowoc, Wis.

Branches
All leading cities

"Outdoor" case is both weathertight and tamperproof.

Paragon Time Switches are distributed by all leading electrical jobbers

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Reserve your

copy *now*

of the

ELECTRICAL BUYERS REFERENCE

FOR 1938

of

ELECTRICAL CONTRACTING

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A complete directory of electrical and allied products

●

CLOSING DATE FOR ADVERTISING OCT. 15th

●

330 W. 42d St., New York

***OUTDOOR SELLING** is always aided by good lighting, as on this L-shaped used car lot. Contractors everywhere can find such opportunities.*

Swimming: Are the evenings in summer consistently hot, so that relief would be welcome?

Golf Driving: Are the evenings so short or local courses so crowded that the average player cannot get in much golf except on week-ends?

The individuals operating such projects are not hard to contact. Their business depends on meeting the public. Get your facts in order. Know about how much it is going to cost him per hour or per evening. Then present your case.

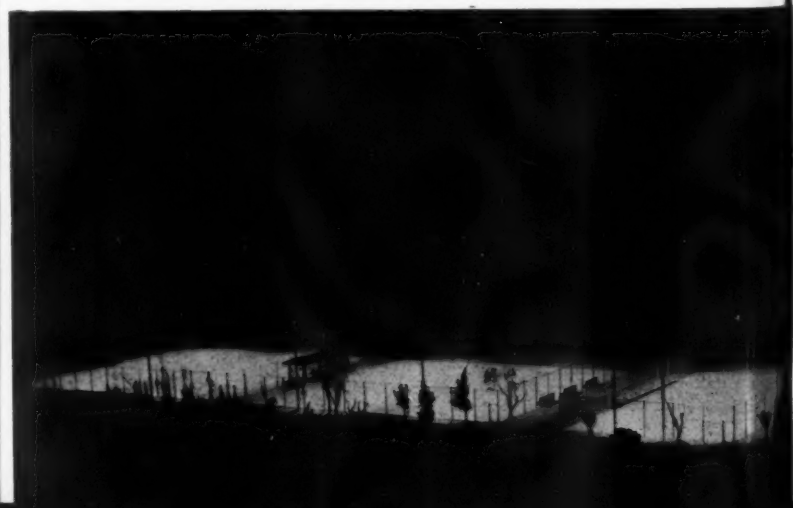
Private projects are more varied. The more exclusive club may feel that except for the swimming pool, night lighting is unnecessary because its members have ample time during daylight hours. However, there are many clubs —especially tennis clubs—which are faced with the problem of extending their facilities and yet have no ground or financial resources for enlarging.

The average tennis club enjoys its peak play in the evenings, which, except for mid-summer, are too short to take care of everyone. In most cases, the officers of such groups have never thought of lighting. Bring it up. Take them to some neighboring community where they can actually play under night conditions.

Never put in a trial installation for sports lighting. It will not be effective unless a complete job is done, and this will usually be too expensive as a sales method. A half lighted field or court is not impressive and will not aid the average prospect in visualizing the final job. But photographs of other clubs in use at night are very helpful.

The possibilities of business from public projects is largely a local problem. Some communities would expect their own maintenance force to do the work, others would have trouble arranging their budget, Success depends on the political set-up. You can be the only judge of these possibilities in your town.

***SMALL PLAY PLACES** still unlighted are to be found in every city, waiting to be fitted for after-sundown tennis, horseshoe pitching or other recreations.*



2. How to Sell Service Stations

There are nearly 200,000 gas stations in the country, 90 per cent of them privately owned. How many are decently lighted? No one really knows, but a generous survey in several different areas indicated not more than one in fifteen. Yet service station lighting is show window lighting and store lighting rolled into one. The lighting attracts the trade, the same lighting enables the attendant to service the customer.

Since so many gas stations are individually owned, sales contacts must be made direct. Demonstrations are possible, but seldom worth while except for a chain. As in sports lighting, one or two units will not make an impressive showing and a full job is probably too expensive.

So, talk in terms of rival stations. Talk equipment. Talk attraction results. Take your camera and snap a picture of the station in the daytime. Use ink to black out the daylight around the station. Touch up the station colors with crayon and for less than 15 cents you will have an impressive selling picture. The contrast of black and white will make the station more impressive, more outstanding, just as under actual night conditions.

3. How to Sell Car Lots

Used cars are sold largely at night, the leisure time of those who are in the market for this class of product. For the average buyer makes his list headed "Worth Another Look" during the evening.

The value of lighting parking lots depends on the type of trade. If it is wholly commercial there may be some doubt. Yet the busiest time of even these lots is from 4:45 to 6:00 P.M. when there is darkness for almost four months a year. Again if the district is a busy one, or has large theatrical crowds, the need for lighting is evident.

Better light for these areas can be demonstrated and can be sold. The lighting problem is one of covering large areas and a successful demonstration over part of the lot merely means repetition for the entire area. The best selling tools are night photographs and light-meter readings on competitive lots, compared with a night view of the prospect's premises. A doctored picture showing the recommended installation and a trial installation will also help.

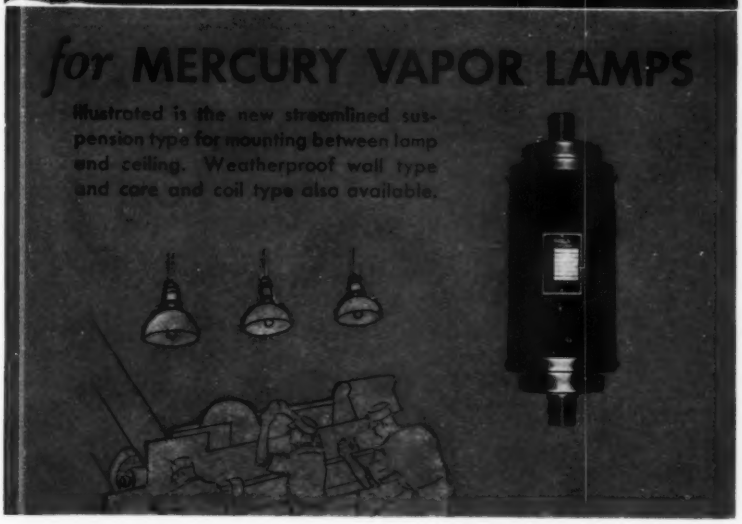
A Complete Line of

SOLA TRANSFORMERS

for every modern requirement

for MERCURY VAPOR LAMPS

Illustrated is the new streamlined suspension type for mounting between lamp and ceiling. Weatherproof wall type and core and coil type also available.

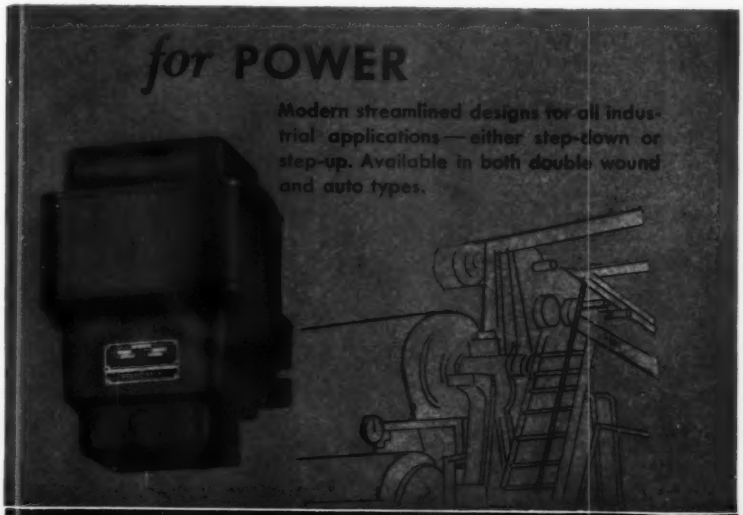


NEW

A compact weather proof, cylindrical transformer for service station and flood lighting. All wiring connections easily accessible after transformer is installed. Write for specifications.

for POWER

Modern streamlined designs for all industrial applications — either step-down or step-up. Available in both double wound and auto types.



SOLA ELECTRIC COMPANY

2525 CLYBOURN AVE. CHICAGO, ILLINOIS

RELIANCE *announces*

THE NEW MODEL W

Compact — outside dimensions are only 7¼ x 4¼ x 3⅞ inches deep. Note, however, that plenty of wiring space is provided and there are four convenient combination knockouts on bottom, sides and back.

A SYNCHRONOUS ELECTRIC TIME SWITCH OF EXTREMELY SIMPLE, COMPACT, ECONOMICAL AND DEPENDABLE CONSTRUCTION which covers practically every time switch use with only . . . THREE TYPES . . .

Here is a complete new line of synchronous time switches that will answer nearly every requirement. Embodying the very latest ideas in design and construction it offers innumerable exclusive features.

In addition to the usual straight ON and OFF types, one type is built for the control of two circuits, giving six different combinations of two-circuit control by merely setting the trip hands for the desired sequence of operation. May also be used as a straight ON and OFF switch if desired and can be wired single or double pole.

A powerful self starting synchronous motor comprises the time element. Switch contacts are of pure silver rated at 30 amperes at 125 volts. The entire unit is heavily constructed for years of dependable service. Fully guaranteed against defective workmanship and material.

This switch will open up many new sales opportunities for you. Regardless of what type of time switch control your customer wants, you will probably find the solution in this model.

THE RELIANCE LINE OF TIME SWITCHES

is comprised of the RELIANCE, RACINE, BADGER and the new MODEL W RELIANCE. The 31 standard types in the line are the result of over 28 years of concentration in this highly specialized field. Full information on this profitable line will be gladly sent on request.

PRICES

★ **TYPE W-11** Single pole, single throw. LIST.. **$13.00**

★ **TYPE W-22** Double pole, single throw. LIST.. **$14.00**

★ **TYPE W-33** Single pole, two circuit. LIST..... **$16.00**

New descriptive literature is just off the press. Write for complete information.

●

RELIANCE AUTOMATIC LIGHTING CO., 1937 Mead St., Racine, Wis.

Your Banker Would Like to Meet You [FROM PAGE 21]

All of that may sound complicated. Actually, it is the type of data that most businessmen have at the fingertips. Though banks do expect to get most of it down on paper, in the form of a balance sheet and income account, the more general information can be supplied by word of mouth. And once a bank is satisfied to the point of granting a line of credit, it is never much trouble to revise the data periodically to keep it up to date. The only point to remember is that each time an actual loan is granted, the banker likes to make a resurvey of the borrower's condition.

The Basic Rule

Most businessmen can judge pretty well whether a bank will be receptive to lending money. There are certain rule-of-thumb standards that most banks require. They are not hard-and-fast; there are exceptions to every rule. But for the most part, the banker would like a borrower to have cash on hand equal to 12 per cent of current liabilities. Thus, if a man has merchandise accounts payable and short order obligations totaling $5,000, the bank would like him to have at least $600 in cash on hand or in banks. If he has more cash than that, so much the better.

But, you ask, how is a borrower to pay $5,000 with $600 in cash. Obviously, he cannot. But he also has accounts receivable—that is bills which are expected to be paid the first of the month. The banker expects that cash plus accounts receivable will be equal to accounts payable. In that way, the quick current assets, assuming all customers pay, will be sufficient to meet all current indebtedness, including bank loans. In addition, the banker likes to see all current assets (including inventories) at least twice the amount of current liabilities. That means that the inventories a business has on hand can be sold to pay off debt, if necessary.

And one more thing, as a precaution, banks do not like to see a business heavily over-inventoried. The standard rule-of-thumb measure is that inventories may amount to 50 per cent, but seldom more than 60 per cent of current assets. Thus, if cash and accounts receivable amount to $5,000 and liabilities come to $5,000, then a fair inventory position would be $5,000. If, on the other hand, cash and accounts receivable aggregated $4,000 and inventories $6,000, banks are not impressed.

Another factor which tempers all lending policies of banks is turnover. The slower the turnover, the more cash a bank likes to see a customer have on hand; and if turnover is rapid, then the cash requirement is not very great. Another is maturity. Banks do not make capital loans. They do not want to lend money on long term. Rather, they like a 90- to 180-date maturity. A reason for this is that 90-day paper is rediscountable at the Federal Reserve Banks. And even though banks have plenty of excess reserves today, and do not have to borrow from the central bank, they still like to have their loan portfolios available . . . just in case.

Hence, it behooves the electrical contractor, when he borrows from a bank to fix a date of maturity and to meet it. A human failing is to agree to pay off a loan and then to ask for an extension. Banks will extend notes, of course. But they do not like borrowers to get into the habit of expecting leniency. Prompt payments always assure another advance, when necessary. And above all, banks want their borrowers to clean up their books periodically, at least once a year; that is, they want to see the business man entirely free and clear of debt. That would be in times of seasonal slack, naturally.

Basically, the banker wants to be certain that he is not lending long-term capital to a business, and that is why he likes a periodic clean-up. If a business is in debt all the time, then it is prima facie evidence that that business has not enough money to run itself; it must get funds from the bank, and therefore it is undercapitalized. When a banker discovers that, after a time he will politely suggest to the constant borrower that he try to raise some money some other way—either by having partners or stockholders put additional capital into the business, or by raising mortgage money. The banker will be courteous but firm in saying "We cannot risk our funds as capital in your business."

Most business loans are made strictly on the basis of a good financial statement and a satisfactory earnings account. At times, banks will advance money with a contract for work as security; and of course they will make loans on stocks or bonds. But commercial loans are best arranged on the general credit of the enterprise. And if the borrower is prompt in paying, if he keeps his banker informed periodically of significant changes in his financial position, he need have no fear of having his line of credit cut off. Banks like to have a steady stream of borrowers, coming in, getting money, and paying off. Turnover is just as important to a bank as it is to a department store or for that matter an electrical contractor.

So, therefore, don't wet your lips and curl your handkerchief when you go into a bank for a loan. The banker is just as anxious to make your acquaintance as you are to make his.

A SIMPLE, SAMPLE STATEMENT ANY BANK WOULD LIKE TO LEND ON

Assets		*Liabilities*	
Cash on hand and in banks	$2,998.67	Notes payable	None
Accounts Receivable	12.501.33	Merchandise accounts payable	$4,987.92
Inventories	12,000.34	Payroll due and payable	1,012.08
Plant and Equipment	5,000.42	Mortgage debt	None
Good Will	1.00	Capital	15,000.00
		Earned Surplus	11,501.76
TOTAL ASSETS	$32,501.76	TOTAL LIABILITIES	$32,501.76

Such a statement, showing quick assets of $27,500 (cash, accounts receivable and inventories) against current liabilities of $6,000 (accounts payable and payroll due) should be good for a loan of from $5,000 to $7,500, and possibly even $10,000. However, a lot depends on the nature of the accounts receivable and the rapidity of the inventory turnover. Moreover, banks would be bound to consider the purpose of the loan.

If funds were wanted for fixed capital, such as new plant, or if there were indications that the borrower wanted to speculate in inventories, bankers would pursue a more cautious lending policy. But the 4.6-to-1 ratio of current assets to current liabilities would be a strong talking point. One thing worth remembering is that bankers like a complete statement, down to the last cent. Round numbers won't do. Therefore, when you show a banker your statement let it come down to the last cent—not $3,000 cash on hand, but $2,998.67.

UMI

Editorials

Earl Whitehorne, Editor

Tydings-Miller What It Means

There are good tidings in the new Tydings-Miller Amendment to the Sherman Anti-Trust Act. It will probably mean a good deal to most motor shops and contractors in the resale of manufactured products.

In a word, this new law permits the manufacturer to set up resale price control through vertical agreements with his wholesalers and retailers within a state "on branded commodities, in free and open competition." It does not permit him to make horizontal resale price agreements with competing manufacturers in his field. He can not set up his resale prices nationally—only state by state, under each state's own fair trade law. But it serves to release intrastate operations from former restrictions of the Sherman law, in this particular.

Also, the Tydings-Miller Act is already in effect. It will not have to drag along indefinitely, like the Robinson-Patman situation, waiting for the courts to prove it constitutional. The courts have already upheld the soundness of state fair trade laws, and the new price control will operate under these state controls. It ought to help.

As To Grounded Tools

Leading manufacturers of portable tools have commented on our August editorial on the man killed in Miami, while using a portable tool. Backed by the Electric Tool Institute, it is now standard practice with many of them to equip all portable tools with three-conductor cord, to provide for grounding. Some started it in 1929. They experience great difficulty, of course, for lack of three pole outlets to connect tools to, and some attach a tag warning the men to clamp the ground wire to a water pipe. But the workman too often disregards the warning.

The contractor has a responsibility here—to urge the installation of three pole receptacles, wherever tools are to be used, to warn the customers against neglecting to ground tools that have three conductor cords, or avoid using tools that have no grounding wire in the cord. A drive among portable tool using customers to sell proper outlets would be worth while.

It is gratifying that so many manufacturers are so actively meeting the need. They should have the support of all dealers who sell portable tools and contractors who can influence the users. The safety idea can be sold here as well as in bathrooms.

Does Nobody Care Any More?

For thirty years electrical contractors, wholesalers, manufacturers and power companies have all been concerned because the other branches of the industry fail to understand them, So one day someone suggested a good idea—that each of the major national associations invite the others to send official delegates to attend its convention. It was done for several years. On one occasion the president of N.E.L.A. attended the contractors' convention at Hot Springs, Arkansas. He got a new angle on the contractors' problems and interests and attitude. They discovered that the horns he was supposed to wear were quite invisible. It was a good thing all around.

Now that profitable experience is not only forgotten, but this year the contractors and the wholesalers hold their conventions the same week, starting the same day, one in Los Angeles, the other in Cleveland. And those who want to be at both, are out of luck. And just to make it more so, the manufacturers hold their convention the next week in Chicago, so everybody wanting to meet with them as well as NECA must rush back instead of covering the Coast while they are there.

Of course, it is customary for Democrats to attend only their own rallies and hear themselves praised. But it wouldn't do them any harm to drop into a Republican meeting sometime and see what the GOP's think. Primarily each electrical convention is held for its own crowd. But it would certainly promote better understanding if each group would be officially represented at the other's annual meetings and report back. It would calm down a lot of friction at times and make for unity of purpose, policy and program.

Many manufacturers attend wholesaler and contractor conventions to contact their customers. Some wholesalers go to the contractors' meetings. The electrical press covers all. Why not arrange the dates so that it is possible? Some time ago, NEMA offered to act as a clearing house for convention dates, to avoid these conflicts. What has gone wrong this year? Doesn't anybody care any more?

Costs Are Up- Why Not Bids?

Since the beginning of the depression the cost of labor in dollars has increased from 10 to 30 per cent. The output of labor, in the same time, has decreased about 50 per cent. Materials in the same period have gone up anywhere from 25 to 200 per cent. All these figures, of course, will vary with the locality.

The point is that the cost has climbed and climbed high. But there are too many contractors, who do not figure this all into their bidding. They have a "depression complex", as one kind western contractor puts it, and they are not only jeopardizing their

own investments in their business, but destroying the market for every competing contractor. And it is not confined to any one section of the country. All over, estimators are failing to keep up with these mounting costs.

If electrical contracting is a respectable business, then the prices at which its products and its services are sold should be sufficient to cover not only the immediate job costs, but maintain suitable offices and shops and return a fair percentage of earnings on the capital. And why not? The public approves of such a policy, and is ready to pay, because all buyers know that unless an adequate price is charged no service can be thorough and dependable.

Much of this under-pricing is the result of carelessness, a lack of the system needed to keep the organization in step with changing conditions. It is a kind of carelessness that wrecks most of the businesses that fail. And the only thing that is needed to cure it is courage.

Whose Language Do You Talk?

When the wagon just rumbled around and the driver said—"Want any ice?"—the ice business was in a bad way. Electric refrigerators were running them ragged. Then the ice man woke up. He too got an air conditioned cabinet and talked refrigeration and food preservation and now everything is on the up. Why not? For when you talk the customer's language and show knowledge of his problems, he is always interested.

Just so, more industrial wiring business than most contractors have ever done is now waiting, right around the neighborhood, for the man who will show an intelligent, neighborly interest in the problems of those factories. Go in and talk about wiring or control or motors and nobody will want to do anything about it. But talk about reduced plant output, delayed delivery, product spoilage, overloads, outages, delays in restarting after shut downs, accidents, and expenses of maintenance and that is something else. It leads inevitably to a summary of existing conditions and a report on system troubles and that means not only wiring but control, motors and lighting.

It is just selling—and selling does it in any plant, at any time. And on this approach there is usually no competition to figure against. It becomes a matter of the problem and the service. This is the kind of work to spend time on because it pays.

Whose language do *you* talk as you go around?

Back Talk

He Still Wants Chocolate

To the Editor—Your editorial is interesting. I should like to sit down and discuss the wiring question with you. I carefully avoid suggesting that we discuss the "different points of view," for, as a matter of fact, our viewpoints, at least as they are always expressed, are identical.

Take the last paragraph of your editorial. We agree that "We want economy. We want flexibility. We want progress." I think I would eliminate the "But" in your next sentence. And if I were writing the paragraph, I would place that sentence first, because there is no utility man who does not realize that safety must come before everything else. No suggestions that have ever emanated from the power companies have been made except on this premise. Our whole business depends upon safety.

But we do think that it is possible to have safety and still have economy, flexibility, and progress—not to mention a little "chocolate sauce"—not alone for the inspectors, contractors, manufacturers, labor and the utilities, but, perhaps more important, for the ultimate customer—the public. Increased business will benefit everyone.

You refer to my remarks about a two-part Code. Such a Code would tend to simplify both the understanding and the administration of the Code. There is no reason, as far as I can see, why both parts of the Code should not have the full authority of the present Code.

Edward T. Gushee,
Vice-President Detroit Edison Co.

"Werry 'Andsome," Mr. Gushee! We too do not believe the two sides are very far apart—they only think they are. We would like to help a little toward bringing these viewpoints together. Let's talk it over.

He's Agin the Sacred Cow!

To the Editor—"Old No. 14—Our Sacred Cow!" It is a hell of an interesting editorial so I lay down old Oscar Pliers for this brief reply.

I don't honestly agree. While you call No. 14 wire our sacred cow, it still gives dam good milk. You ask to use No. 12 for branch circuits. You don't say anything about branch circuit fuses, so I assume you advocate the increase in fuses for this circuit. I must agree that bigger copper is necessary to remedy such conditions. The data on voltage drop in your article is important but why pick on old man No. 14 wire, whom you claim is our sacred cow?

Why not put a fence around this cow and keep her where she belongs? Our 15 ampere branch fuses give her too much territory, so why not confine her to a 10 ampere field? As to more outlets why not run more branch circuits of this 10 ampere variety and with No. 14 wire? An electrical flash caused by shorted wires still depends on the size fuse behind it. Making such circuits larger means more trouble. I have always been for 10 ampere branch circuits for these reasons.

Fred Renner,
Milwaukee

Atta Boy! But how can we sell John and Mary on smaller fuses? They clamor for bigger and better everything. No, it will be easier to solve our problem with bigger wire than smaller fuses. But we like your come back.

But This Is Art

To the Editor—In Electrical Contracting I saw a picture of a beautiful girl, and, at her feet, on bended knee, a wire-pushing Adonis.

At first glance I was prone to believe that load of pulchritude was the rubber peeler's sweetheart, but, becoming more intensive I take this dame as the mistress of the new shack—the wife of the guy who signs the checks for the lumber and bricks. There she sits—holding a set of plans—and getting tagged!

Now, as an electrical worker, I am loathe to believe a member of my profession can practice the art of intrigue with a wife of the big-shot. But look at the smile and the attitude of that big bum! And look at the lady in question!

I have heard of affairs of plumbers and painters, and the crafty icemen. But, in the heart of the true artisan of the knife and pliers, I believe there has always existed a chasteness that is as sound as Ohm's Law.

Harold F. Hutchinson,
Frankfort, Ind.

Now who could dare to doubt it?. But after all that ad stopped you. And there you are.

Grounding Portable Tools

To the Editor—We have noted your editorial "Why Kill More Men." We are very much in agreement. It is extremely unfortunate for even one man to be killed using electrical equipment.

However, you may not be conversant with all of the facts from the standpoint of the portable electric tool manufacturers. This company, ever since January 1929, has realized the necessity for having portable tools grounded with three-conductor cord. It is our policy to equip all of our tools in this way. We believe, if you were to canvass all of the portable electric tool manufacturers, you would find that the majority are using three-conductor cords, with one wire for grounding.

There are other circumstances beyond the control of electric tool manufacturers. There are tools in service made prior to the time when the three-conductor cord was introduced and still have the two-conductor cord on them, with no means for grounding. Also the customers often service their tools themselves, and put on two-conductor cord in place of the three-conductor cord that was supplied as original equipment. But all tools coming into our factory service branches and authorized service stations, requiring new cords are sent out with three-conductor cords on them, regardless of what they had when they came in.

We, therefore, feel that from the standpoint of the tool manufacturers the story is not as bad as it would seem from your editorial. We hope that one hundred per cent of the tool manufacturers will equip the tools with three conductor cord soon, if they are not already doing it.

B. R. Ramey
Black & Decker Mfg. Co.

Thanks, Mr. Ramey. This is good news. We hope our comment will influence more contractors to help you protect users against this hazard.

He's for Old No. 14!

To the Editor—Your "Old No. 14 editorial" certainly is good—true in every particular. I have heard a lot of cow stories but this one takes the cake. The unique phrasing you have used calls attention to the inadequate wiring problem as it has never been done before.

I have been passing your sample copy around among our officers and department heads in the Commercial Department, and find their universal comment is that it is the best article they have seen in many a day.

W. L. Frost,
Vice-President,
Southern California Edison Co.

We love these flowers. And much obliged to you, Jack Frost, and the many others who have written in about this outburst.

WIRING Methods

FIXTURE DISPLAY TROUGH

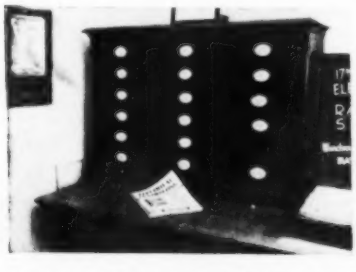
Krause & Hiel have a convenient method of displaying fixtures in their Syracuse, N. Y. store. Twelve foot wir-

FIXTURE OUTLETS—Are spaced on a trough suspended from the ceiling and connected to a plug receptacle for fixture display.

ing troughs have outlets on the lower side spaced on 16" centers, and wired in the back with cable. A heavy duty plug at one end connects to a ceiling receptacle. Each trough is suspended from three pipe stems. Changes in the store layout can be made economically and a large number of "live" outlets are provided for display.

KEEPING SMALL RECORDS

Letter files usually balk when used for such small items as permits, time slips, etc. Moreover these pesky items get dog eared or slip out of folders and fall on the floor. So up in Canada the Millen Electric Company of Windsor, Ontario, has an 18-drawer wooden cabinet for this purpose.



SMALL-ITEM FILES—Eighteen tray cabinet in Canadian contractor's office holds an array of small records like time slips and permits.

Each drawer or tray has its contents filed flat, and a spring clip presses down on the pile to keep things from sliding around. Labels on the front designate the tray's contents such as: telegrams, cash slips, time slips, permits, association records, and other items. They are put in, with the oldest item at the bottom of the heap.

SPACING TILED-IN OUTLETS

With glazed tile, washable surfaces, now so much in vogue in dairies and other food processing plants, there is an

FLUSH IN TILE—Carefully placed vapor-proof fittings, in glazed tile walls provide a tight gasket fit and a good appearance.

exacting installation problem when it comes to putting vapor-proof outlets in such walls. These outlets must be accurately installed to permit the cover gasket to be clamped tight against the device fitting, to exclude water applied with a hose. Also, the finished outlet must not leave the cover projecting from the tile surface so far as to expose unsightly edges of the assembly.

In wiring a new dairy plant at Huntington, W. Va., the Quinlan Electric Company set all vapor-proof switch and plug outlets to leave the face, or rim of the fitting projecting 3/16-in. from the tile. When the gasketted covers are installed over the devices the job will be right.

CONDUITS STAY PUT

What looks like a solid plank hung from the ceiling in this picture is actually a group of two 1-in. and six ¾-in. home run conduits at a panelboard

ACCURATE ROUGHING—Home runs from ceiling are just the right length to fit top of surface cabinet.

location in a Cleveland newspaper building. It is being wired by the Martien Electric Company. Careful roughing in, and the attachment of wood clamping strips near the bottom ends, has kept the conduits in good alignment ready for the surface type panelboard to be installed, without further nippling being required.

FLOOR GROUTED RACEWAYS

Top-of-floor conduit runs are always hard to keep in exact position until the floor fill has been applied. This view of a special laboratory area in the new Mellon Institute of Industrial Research shows how the Iron City Engineering Company of Pittsburgh handled the problem. They strapped the loose conduits to the rough concrete floor, then applied a mixture of rich concrete in patches or mounds to bind these runs securely to the floor.

Most of the runs are 1-in. and 1¼-in. conduit, equipped with short-radius elbows, and pipe cap end-seals to exclude dirt. A special top-of-floor junction box was installed at the rear of this room for the full width of an instrument switchboard, which will be used

A HOME

• • • *not just a building*

Genius may flourish in an attic . . . but solidity and refinement must be nurtured in more cultured surroundings.

It is the TRIANGLE belief that this philosophy may well be applied to the upbringing of electrical products.

This is a belief substantially evidenced by the TRIANGLE home. The *abilities* of personnel can best function when the *facilities* for serving are *right*.

TRIANGLE CONDUIT & CABLE CO., INC.
Horace Harding & Queens Blvds., ELMHURST, NEW YORK CITY, N. Y.

ARTERIES FOR ELECTRICAL SYSTEMS

It MUST *be right!*

UMI

REWIRE FOR LAST TIME

THE ADDITION OF PLUGMOLD CONTINUOUS OUTLET SYST

HERE IT IS!

Outlets placed where needed — quickly!

MEETS ALL TRADE REQUIREMENTS

1. Based on sound engineering!
2. Proof against amateur tampering!
3. Installed by wireman only!
4. Assembled on the job!
5. For new or old buildings!

2127
A small sturdy Plug Receptacle with finding grooves for easy plug connection. Sets flush with Cover 2100C.

2100 C
Flush mounted cover

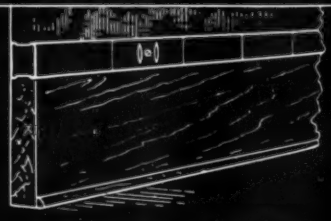
2100 C
Cover scored in (3 inch) sections equal in length to Receptacles No. 2127. Hence outlets may be placed anywhere, anytime — singly or in groups on 3-inch centers and up.

Width Overall 1¼"
Height Overall ⅞"

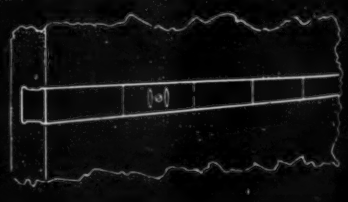
2100 B
Channel has knockouts for ½ inch conduit every 8 inches — also knockouts for screw holes.

CAPACITY up to 6 No. 12 wires.

SETS ON THE BASEBOARD



SETS INTO PLASTER



THE WIREMOLD COMPANY, Hartford, Co

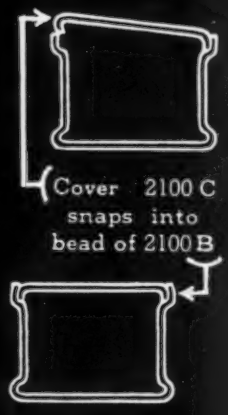
UMI

PREWIRE FOR ALL TIME!

SYSTEM TO WIREMOLD LINE MAKES THIS POSSIBLE!

PLUGMOLD

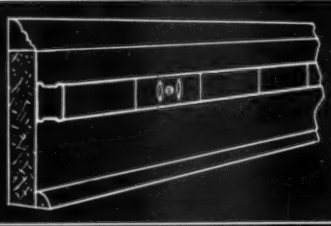
THE WIREMOLD CONTINUOUS OUTLET SYSTEM



MEETS REQUIREMENTS OF BOTH TENANTS AND OWNERS

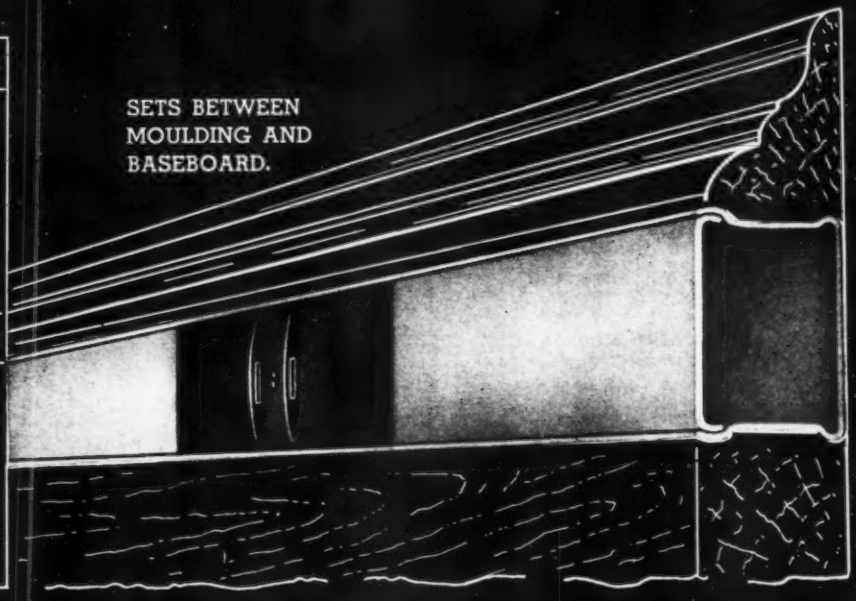
1. Install wiring now — add outlets as needed!
2. Pay only for what you need today — no heavy investment for future requirements.
3. When new outlets are needed — install them in a jiffy at small cost.
4. Keep step with progress of electrical service — but pay as you go and save your money.

SETS ON FACE OF BASEBOARD



ON SURFACE—BASEBOARD HIGH

SETS BETWEEN MOULDING AND BASEBOARD.



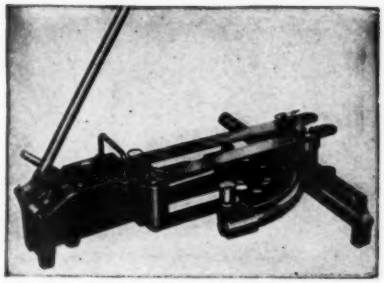
Write to Engineering Department for FREE BLUE PRINTS of Typical Installations

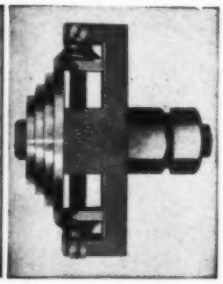
Use GREENLEE TOOLS FOR Better Wiring Jobs and Greater Profits

On jobs where Greenlee Tools are used, contractors not only are able to do better work, but many operations can be performed faster and with less effort on the part of the workmen. This makes it easier to realize a profit, something that can't be overlooked in any business. So evident is this in bending conduit and enlarging knockouts that many have reported to us that these tools paid for themselves on the very first job.

Hydraulic Benders

Above is the Rigid Conduit Bender in action. It is readily portable and simple to operate. Bends made with it are smooth and accurate, with very little distortion in the metal. No. 770 bends all sizes from 1¼ to 3". The large bender, No. 775, handles all sizes from 2½ to 4½". The No. 770-T Thin-Wall Steel Conduit Bender is shown to the right. Same as No. 770 but with attachments for bending 1¼, 1½ and 2-inch thin-wall conduit.





Knockout Tools

Greenlee Knockout Punches and Cutters are labor-saving devices to a much greater extent than their simple appearance would indicate. They eliminate all reaming and filing in the enlargement of holes for conduit in switch boxes, etc., and they perform the operation in a fraction of the time required by other methods. Punches come in two sets for conduit from ½ to 2-inch. The cutter is for all sizes from 1½ to 3-inch.

GREENLEE TOOL CO., Rockford, Illinois

Mail This Coupon To-day

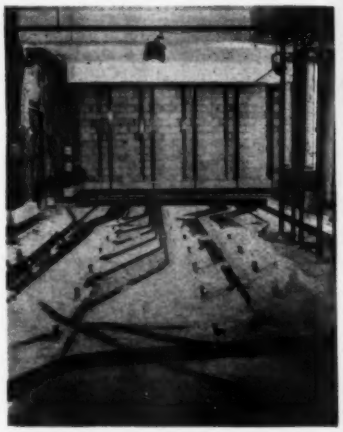
GREENLEE TOOL CO., ROCKFORD, ILL.
Please send information on the following tools:

☐ Rigid Conduit Benders ☐ Thin-Wall Conduit Benders ☐ Pipe Pushers
☐ Knockout Tools ☐ Joist Borers ☐ Electricians' Bits ☐ Bit Extensions

Name ..... *Address* .....

City ..... *State* .....

My Jobber is 10-37



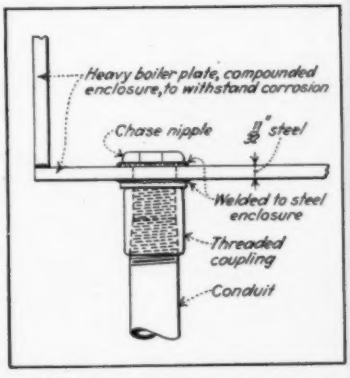
ABUSE INSURANCE—*Extra precautions taken for top-of-floor conduits until floor fill is applied.*

in this laboratory to measure the heat transmission of various types of building materials.

FIGHTING OFF ACIDS

Tapes and compound coatings provided the only satisfactory means to resist the ravishes of acid upon a conduit wiring system recently modernized by the Sweningson Electric Company, for a Chicago paint manufacturer. Here the existing system gave considerable trouble, because of the presence of ammonia fumes, sulphuric acid and salt solutions.

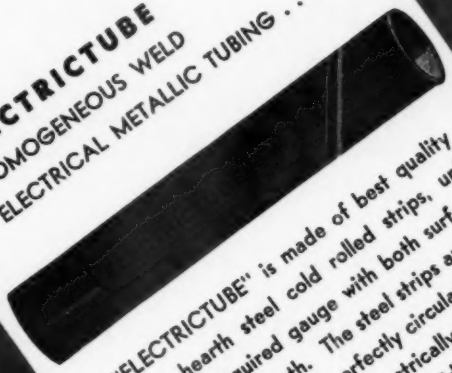
More than 18,000 ft. of 1½ in. wide linen tape was applied with half laps over all conduit, after a base coat of acid and alkali resistive compound had first been brushed on. Two additional coats of this compound known as Lyne-Kote, were then put on the taped con-



FUMES EXCLUDED — Heavy metal enclosures have welded conduit connections and cork-gasketted covers to keep out corrosive acid fumes.

USE THIS BETTER CONDUIT— FOR BETTER BUSINESS

ELECTRICTUBE
HOMOGENEOUS WELD
ELECTRICAL METALLIC TUBING . . .



"ELECTRICTUBE" is made of best quality open hearth steel cold rolled strips, uniform in required gauge with both surfaces extremely smooth. The steel strips are fabricated into tubes perfectly circular in form and homogeneously electrically welded without interior or exterior ridge or groove at seam; tubes are accurate, exterior diameter insuring satisfactory use of any standard dimension threadless fitting; interior diameter same as standard rigid steel conduit pipe of same nominal size.

"ELECTRICTUBE" bends easily and ends flange without breaking or fracturing; tubes are straight with ends square cut and free from inside or outside burr; metal cap is applied to each end to prevent damage.

"ENAMELKOTE" is coated outside and inside with high grade black enamel, properly baked to insure adhesion to pipe wall, and sufficient flexibility to prevent flaking in bending.

CUTS, BENDS, and THREADS EASILY.

Thread ends are protected by Steel—fibre wedge Protectors. Inside of tube enameled so as to permit ease in pulling of wires.

"HOTKOTE". Exterior and interior surfaces smoothly and evenly coated by hot galvanizing process. Coating will withstand more than [illegible] dips of Preece Test and is of a content of more than 1.25 oz. of zinc per sq. ft. of surface.

Furnished with transparent baked enamel coating on both exterior and interior surfaces.

UNDERWRITERS LABORATORIES TESTED AND INSPECTED

DISTRIBUTED BY LEADING WHOLESALERS

"GALVAKOTE". Exterior surfaces, and threads coated with zinc evenly deposited by electro-plating process to withstand more than four dips of Preece Test in regulation copper sulphate solution. Bonds with concrete.

Interior smooth surfaces evenly and evenly coated with heat quality black enamel properly baked to prevent flaking or stickiness. Furnished also with transparent enamel coating on both exterior and interior surfaces if so ordered.

CLAYTON MARK & CO. OPERA BUILDING **CHICAGO, ILL.**

• Eliminated shutdown worries on Compressor Motor Circuit for CROWN CORK & SEAL COMPANY

Details by Mr. Wm. Cooper, Ch. E. E. of Baltimore plant.

"300 ampere fuses used to protect our compressor motor circuit were blowing much too frequently. After an investigation, we decided that if the claims made for BUSS Super-Lag Fuses were correct, we should be able to use fuses of the 200 ampere size and eliminate these needless blows—and at the same time get better protection.

Six weeks ago we installed 200 ampere BUSS Fuses—to date they have not blown once".

BUSS Super

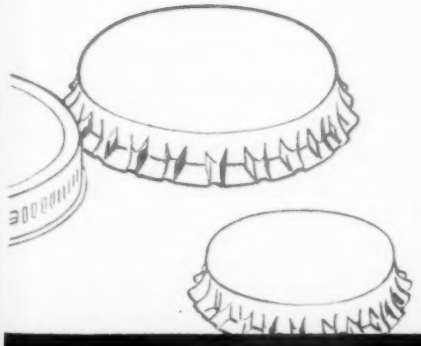
WHY NOT INVESTIGATE FUSES AS DID MR. COOPER?

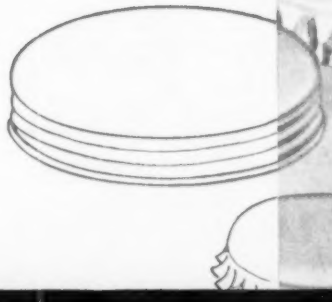
While it is not possible to prove the actual superiority of BUSS Fuses through the pages of a book it is possible to present facts founded on field and laboratory tests. Facts that will be of profitable interest to anyone concerned with plant operation or electrical maintenance.

Thousands of executives, like Mr. Cooper, have found the book on "Fuses Made to Protect—Not to Blow" of absorbing interest. It deals with fuse construction and fuse performance and their relation to plant operation.

We will be glad to send you a copy. Just ask for the Rb. Book

BUSSMANN MFG. CO.
2536 W. University, St. Louis, Mo.
Division of McGraw Electric Co.





Lag FUSES

UMI

MODERN

Built to meet to-day's requirements . . .

AmerTran Type "RS" Distribution Transformers

WHEN you are next in need of distribution transformers consider the many advantages of AmerTran Type "RS". From a study of the design features—see below—you will see that they possess refinements which minimize the danger of damage due to usual causes, such as momentary short circuit, overloads of short duration, line surges, rough handling, exposure and severe usage. Further, you will also find that these units are made so that in the event of damage they can be repaired quickly, easily and inexpensively. Type "RS" establishes a new standard for modern transformer construction and, as a result, is receiving the unqualified acceptance of engineers in utility and industrial plants throughout the country. May we send you Catalog No. 116 which contains complete data?

Type "RS" Features

1. May be completely dismantled and reassembled with a wrench.
2. Bushings of coordinated flashover type — quickly replaced (no soldering) yet incapable of syphoning oil.
3. External parts rust resistant — tanks of copper-bearing steel; covers of nickel-iron alloy.
4. Patented clamps permit removal of coil after end iron only has been taken out.
5. All units are of similar electrical and mechanical design in sizes from 1½ to 100 Kva. for potentials up to 8000 V.
6. Coils of fully balanced design and with ample ventilating ducts are vacuum impregnated in varnish.
7. Rigid core construction prevents damage due to momentary short circuit or rough handling.
8. All units are shipped filled with oil so as to reduce your transportation and installation expense.
9. Design offers high turn-to-turn insulation, linear surge-voltage characteristic and optimum impedance characteristic.
10. Optional feature — lightning protection by Crystal Valve Arresters and grounding gap.

AMERICAN TRANSFORMER COMPANY

178 Emmet St., Newark, N. J.

PRODUCTS

American Transformer Co. manufactures transformers for every industrial, electronic and laboratory application in sizes up to 10,000 Kva. and for potentials up to 132 Kv. Other products: voltage regulators, test sets, rectifiers.

AMERTRAN TRANSFORMERS

Manufactured Since 1901 at Newark, N. J.

WIRING Methods

[FROM PAGE 82]

duits. All fittings and enclosures were painted with three coats of this compound.

Because the fumes were injurious to copper parts of control and distribution equipment, heavy steel housings with cork-gasketted covers and wing nut fastenings were provided. To exclude fumes from enclosures, all conduit connections were welded to the box wall. Compound was then applied to the finished job.

"TRAIN BOARD" RECORDS MEN AND JOBS

Time-clocks are of doubtful value in handling shop men. Too much time is also consumed in verbal checking in and out. So John Jenner, Shelley Electric Company, Wichita, Kansas, devised this adaptation of a railroad Train Board.

Men are chalked up by name. Under each name is written—"Out," meaning

BLACK BOARD CONTROL—Men enter status of each job each day so the boss can see.

at work; or "up," meaning the job is up as far as it can go; or "comp.", meaning it is finished. "Call," means customer will call.

Jobs are listed by numbers—the same as the assignment slip, put each morning into the individual pockets in a wall-fixture. Beside this board hangs a pad of time record slips, on which the men record, work record, job number and time used, for the previous day's work.

With this board, it is possible to tell at a glance where each man is working at any given hour. Work not yet completed is kept before the contractor and the men on the job. Men who might "forget" to punch a time clock, do not mind at all chalking up their progress on this bulletin board. Mr. Jenner recommends it for simplicity, clearness, and efficient handling of a crew.

A GAME CAN BE WON OR LOST —BY ONE POINT

● The outcome of an entire game frequently depends on just one play—one point. The degree of perfection with which that play is executed may determine the success or failure of all of the other plays.

Most electrical contractors know from experience that RACO • ALL-STEEL • PRODUCTS are absolutely dependable—that precision manufacturing has eliminated all vulnerable spots and the possibility of a "one point" failure. As part of the entire job, they can be depended on to do their part satisfactorily.

A total of more than 40 years of manufacturing experience is behind the switch boxes, outlet boxes, cutout boxes, cabinets, fuse cabs and conduit fitting which bear the famous RACO and ALL-STEEL trademarks. Engineering that keeps abreast of modern wiring trends is assurance that RACO • ALL-STEEL • PRODUCTS will continue to maintain their high standards.

Adequate stocks of the complete line of RACO • ALL-STEEL • PRODUCTS are maintained by wholesalers in all parts of the country. Mail the coupon for complete information.

DISTRIBUTED NATIONALLY BY

ALL-STEEL-EQUIP COMPANY, INC.

General Offices: 338 John St., Aurora, Ill.

Factories: South Bend, Ind., Aurora, Ill.

ALL-STEEL-EQUIP COMPANY, Inc.
338 John St., Aurora, Ill.

Gentlemen: ☐ Please mail complete literature on the RACO • ALL-STEEL • PRODUCTS line.

☐ Please have your salesman call.

Name .....

Address .....

City ..... *State* .....

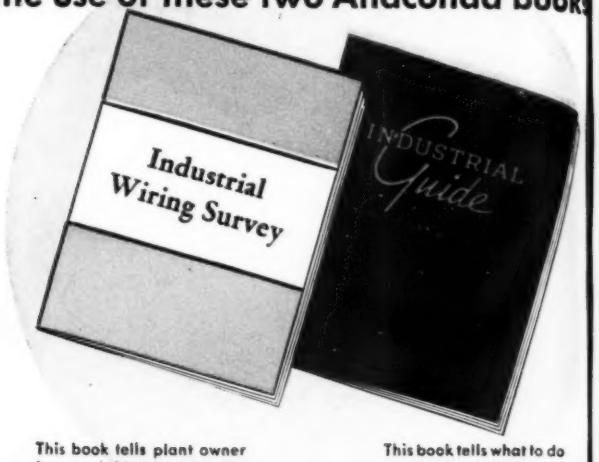
RACO

SWITCH BOXES · OUTLET BOXES · CUTOUT BOXES · CABINETS · FUSE CABS · CONDUIT FITTINGS

UMI

A business-getting

Utilities are obtaining splendid results from discussions of power problems with industrial executives by the use of these two Anaconda books



This book tells plant owner how to initiate a scientific check-up of electric circuits.

This book tells what to do to correct situations revealed by the check-up.

HERE at last is something concrete that you may use your selling! All over the country, contractors are fi ing they can produce profitable wiring contracts by sugge ing a survey of electrical circuits to industrial plant own

The two books shown here point the way. They give a definite, tangible plan for developing interest on the p of industrial executives.

In Anaconda's national advertising, sample of which shown here, we say to the industrial executives: "Stop co losses by making a check-up of electrical circuits." Estima reveal that 9 out of 10 industrial plants today are los money because of antiquated, deficient electrical circu

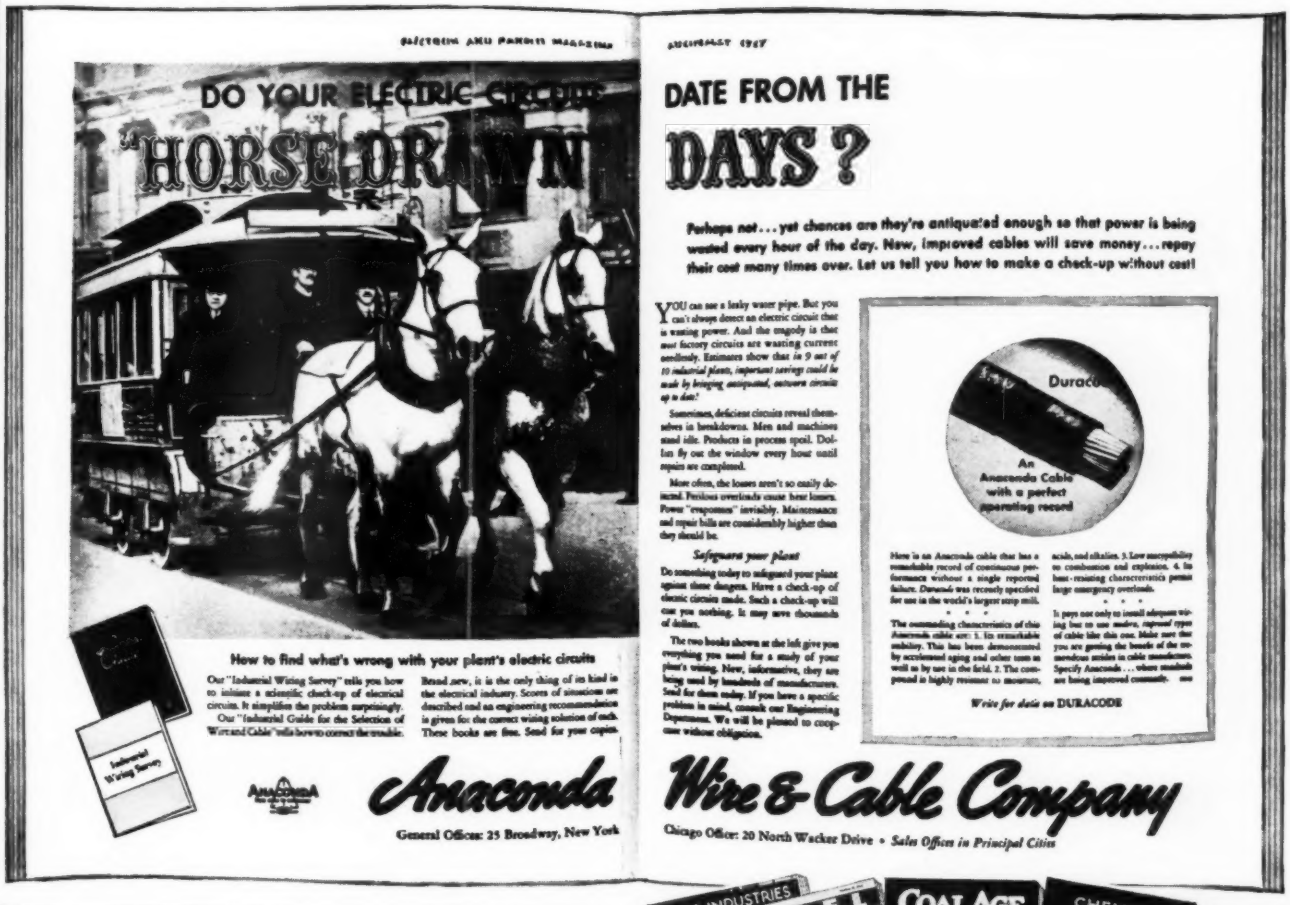
This campaign is sound economics. In promoting more efficient use of electricity, it encourages the purch of more electrical equipment and wiring.

Join in this campaign, as so many other electrical contract are doing, by starting a local campaign tied in with our nati campaign. Write for outline of campaign such as other tractors are now using. The coupon is for your convenie

Anaconda Wire & Cabl

General Offices: 25 BROADWAY, NEW YORK • Chicago Office: 20 NORTH WACKER DRI

...campaign for you, Mr. Electrical Contractor



ELECTRICAL AND RADIO MANUFACTURING

DO YOUR ELECTRIC CIRCUITS

"HORSE-DRAWN"

How to find what's wrong with your plant's electric circuits

Our "Industrial Wiring Survey" tells you how to initiate a scientific check-up of electrical circuits. It simplifies the problem surprisingly.

Our "Industrial Guide for the Selection of Wire and Cable" tells how to correct the trouble.

Both are, it is the only thing of its kind in the electrical industry. Scores of situations are described and an engineering recommendation is given for the correct wiring solution of each. These books are free. Send for your copies.

Industrial Wiring Survey

Anaconda

General Offices: 25 Broadway, New York

AUGUST 1927

DATE FROM THE

DAYS?

Perhaps not... yet chances are they're antiquated enough so that power is being wasted every hour of the day. New, improved cables will save money... repay their cost many times over. Let us tell you how to make a check-up without cost!

YOU can see a leaky water pipe. But you can't always detect an electric circuit that is wasting power. And the tragedy is that most factory circuits are wasting current needlessly. Estimates show that *in 9 out of 10 industrial plants, important savings could be made by bringing antiquated, outworn circuits up to date!*

Sometimes, deficient circuits reveal themselves in breakdowns. Men and machines stand idle. Products in process spoil. Dollars fly out the window every hour until repairs are completed.

More often, the losses aren't so easily detected. Perilous overloads cause heat losses. Power "evaporates" invisibly. Maintenance and repair bills are considerably higher than they should be.

Safeguard your plant

Do something today to safeguard your plant against these dangers. Have a check-up of electric circuits made. Such a check-up will cost you nothing. It may save thousands of dollars.

The two books shown at the left give you everything you need for a study of your plant's wiring. New, informative, they are being used by hundreds of manufacturers. Send for them today. If you have a specific problem in mind, consult our Engineering Department. We will be pleased to cooperate without obligation.

How is an Anaconda cable that has a remarkable record of continuous performance without a single reported failure. *Duracode* was recently specified for use in the world's largest strip mill.

* * *

The outstanding characteristics of this Anaconda cable are: 1. Its remarkable stability. This has been demonstrated by accelerated aging and other tests as well as by use in the field. 2. The compound is highly resistant to moisture, acids, and alkalies. 3. Low susceptibility to combustion and explosion. 4. Its heat-resisting characteristics permit large emergency overloads.

* * *

It pays not only to install adequate wiring but to use *modern, engineered* types of cable like this one. Make sure that you are getting the benefit of the tremendous strides in cable manufacture. Specify Anaconda . . . where standards are being improved constantly. use

Write for data on DURACODE

Anaconda

Wire & Cable Company

Chicago Office: 20 North Wacker Drive • *Sales Offices in Principal Cities*

recent ad in Anaconda's "Modernize Wiring" campaign.

ANACONDA ADVERTISING

Here is a recent advertisement in Anaconda's "Modernize Wiring" campaign. This and other announcements in this series appear in Time, Business Week, Factory Management & Maintenance, and other publications going to industrial executives in all important fields. We offer a complete plan which will enable you to put on a local campaign to tie in with this nationwide promotion. Send coupon for details. 37554

ANACONDA
from mine to consumer

Company

...les Offices in Principal Cities

ANACONDA WIRE & CABLE CO.,
25 Broadway, New York City

We should like a copy of your books and outline for a campaign.

Signed .....

Street .....

City ..... *State* .....

Motor Shops

STRIPPING WINCH

To jerk off old windings from motor stators, Buzzell Electric Works, of San Francisco, has developed a simple application of a motor-driven winch. The motor stator is bolted to a heavy angle iron frame which itself is bolted to the building frame and floor. Underneath the frame is a motor connected through a reduction gear to a smooth drum winch. A heavy rope wrapped around this winch, running up to a pulley in the ceiling and back down to the motor stator frame, provides the power for drawing the old coils from the stator prior to rewinding.

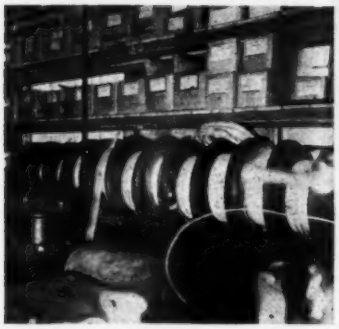
POWER STRIPPER—Also, a portable "growler" which can be moved to large armatures and rotors for testing them while racked on shop horses.

CELLOPHANE LAYER INSULATION

Coils for a quantity of variable speed disc motors of 1/36 hp., wound with cellophane insulation between the layers have eliminated burnouts. The Twin City Electric Company, motor repair specialists of Minneapolis, Minn. found that coils for these display motors, insulated with oiled paper, were heating excessively, under slow speeds, and causing frequent failures. The introduction of cellophane resulted in a more compact coil and kept the temperature within safe limits at all operating speeds.

STORAGE SHELVES

Shelf frames were made up by the Electrical Maintenance Service Company of Bridgeport, Conn. from 1¼ inch pipe and 2x2 angle iron with removable wooden shelves. The angles are fastened to the pipe uprights with ⅜ U bolts allowing adjustment in the height. The shelves are made of ⅞ tongue and groove boards in four foot sections, 30 inches deep.



STURDY SHELVING—Made with standard lengths of material for quick alteration and high salvage value.

This shelving has the advantage of being easily moved or altered and is entirely salvageable. 800 feet of this type are in use in the shop.

MOTOR TESTING CHART

The use of a prony brake arm, in conjunction with a direct-reading scale for checking motor performance, results in variations due to the h.p. rating of motor, the speed, and the length of prony brake arm employed in making a test. To simplify the calculations involved in making such tests, the Electrical Maintenance & Repairs Company, Ltd., of Toronto uses a chart that has the weights all figured out for the most common types of small motors. These values were determined from the prony brake formula:

$$W = \frac{H.P. \times 3{,}300}{RPM \times 2 \times \pi}$$

This chart covers both 25 and 60 cycle motors, as the standard speeds are different for each group. While the values are given in lbs. and oz. for

Table No. I—25 Cycle Speeds

1 ft. Arm					2 ft. Arm							
Hp.	1420 rpm		710 rpm		Hp.	1420 rpm		710 rpm		480 rpm	
	lbs.	oz.	lbs.	oz.		lbs.	oz.	lbs.	oz.	lbs.	oz.
	Factors or 1 Hp. 3.6987 lb. 7.3974 lb.					Factors for 1 Hp. 1.84935 lb. 3.6987. lb. 5.5480 lb.					
1/30		2			1/2		15	1	14	2	12
1/20		3			3/4	1	6	2	12	4	3
1/15		4			1	1	14	3	11	5	9
1/12		5			1½	2	12	5	9	8	5
1/10		6			2	3	11	7	6	11	2
1/8		7½		15	2½	4	10	9	4	13	14
1/6		10	1	4	5	5	9	11	2	16	10
1/4		15	1	14	4	7	6	14	10	22	2
1/3	1	4	2	8	5	9	4	18	8	27	12
1/2	1	14	3	11	6	11	2	22	3	33	5
3/4	2	12	5	9	7½	13	14	27	12		
1	3	11	7	6	10	18	8				
1½	5	9	11	2							
2	7	6									
2½	9	4									
3	11	2									

PRONY BRAKE TESTING CHART For 25 cycle motors with 1 and 2 ft. arms. (left)

For 25 cycle motors with 3 and 4 ft. arms (right)

Table No. II—25 Cycle Speeds

3 ft. Arm								4 ft. Arm							
Hp.	1420 rpm		710 rpm		480 rpm			Hp.	1420 rpm		710 rpm		480 rpm	
	lbs.	oz.	lbs.	oz.	lbs.	oz.			lbs.	oz.	lbs.	oz.	lbs.	oz.
	Factors for 1 Hp. 1.2329 lb. 2.4658 lb. 3.6987 lb.								Factors for 1 Hp. 0.9247 lb. 1.8494 lb. 2.7740 lb.					
1½	1	14	3	11	5	9		5	4	10	9	4	13	14
2	2	8	4	15	7	6		6	5	9	11	2	16	10
2½	3	2	6	3	9	4		7½	6	15	13	14	20	13
3	3	11	7	6	11	2		10	9	4	18	8	27	12
4	4	15	9	14	14	13		15	13	14	27	12	41	10
5	6	3	12	5	18	8		20	18	8	37	0	55	8
6	7	6	14	13	23	3		25	23	2	46	4	69	6
7½	9	4	18	8	27	12		30	27	12	55	8	83	4
10	12	5	24	10	37	0		35	32	6	64	12	97	2
15	18	11	37	6	56	1		40	37	0	74	0		
20	24	10	49	5	74	0		50	46	4	92	8		
25	30	13	61	10										
30	37	6	74	13										
35	43	3												
40	49	5												

It's the New FA TRADE MARK

"DUBLBRAK" CIRCUIT BREAKER

For 125 Volt AC or DC Service . . . 6 to 50 Ampere

Here's the new (FA) thermal Circuit Breaker . . . made exclusively by Frank Adam . . . incorporating positive, double break contacts, with low-arcing, quick-make and quick-break action.

Entirely new design assures automatic interruption of sustained overload or short circuit . . . Trip-free, non-closeable on overload or short circuit.

Approved by Underwriters' Laboratories for both AC and DC Service . . . Available January 1, 1938 . . . Write for details.

When circuit is automatically interrupted, the red-dot signal button pushes out beyond the face of the unit and the handle remains at the "ON" position and indicates the tripped condition . . . To restore service it is only necessary to move the handle to the full "OFF" position and then to the "ON" position.

Frank Adam

ELECTRIC COMPANY

UMI

Their simplicity makes them popular with CONTRACTORS

BM
CONNECTORS
and
COUPLINGS
White Zinc Finish
For Electrical Metallic Tubing

★ Make dependable installations quickly and easily. Only the No. 605 Indenter (shown) or the No. 600 Indenter with interchangeable jaws is necessary to install ½", ¾" or 1" fittings. Holders and cutters are available though vises and hack saws can be used.

★ These B M Connectors and Couplings are gaining in popularity every day with Contractors **everywhere**. Their simplicity in use and the satisfactory results realized make them indispensible to the Contractor who is looking for a really simple method.

★ For further details, ask your wholesaler. *Listed by Underwriters' Laboratories.*

No. 605

B M
INDENTER
FOR INSTALLING ½" FITTINGS

BRIEGEL METHOD TOOL CO.
Not Incorporated
GALVA, ILLINOIS

Distributed by:
THE M. B. AUSTIN CO.
Chicago, Illinois
CLAYTON MARK & CO.
Chicago, Illinois
CLIFTON CONDUIT CO.
New York City
GENERAL ELECTRIC CO.
Bridgeport, Connecticut
THE STEELDUCT CO.
Youngstown, Ohio
TRIANGLE CONDUIT & CABLE CO.
Elmhurst, New York City

Motor Shops

[FROM PAGE 90]

1, 2, 3 and 4-ft. arms, a factor for the 1 h.p. size is given in decimal pounds for each group. Users of such testing methods must always add the "out-of-balance" weight of the brake beam to the weights given.

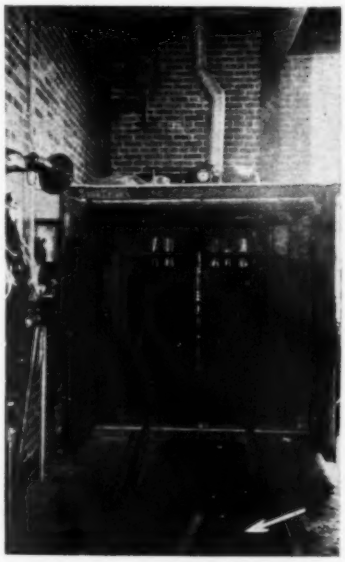
Table No. III—60 Cycle Speeds

1 ft. Arm						2 ft. Arm						3 ft. Arm					
Hp.	1720 rpm		1150 rpm		860 rpm	Hp.	1720 rpm		1150 rpm		860 rpm	Hp.	1720 rpm		1150 rpm		860 rpm	
	lbs.	oz.	lbs.	oz.	lbs.	oz.		lbs.	oz.	lbs.	oz.			lbs.	oz.	lbs.	oz.	
Factors for 1 Hp. 3.0534 lb. 4.5801 lb. 6.1068 lb.						Factors for 1 Hp. 1.5267 lb. 2.2900 lb. 3.0534 lb.						Factors for 1 Hp. 1.0178 lb. 1.5267 lb. 2.0356 lb.						
1/30		1¼		2¾	3¾	1/2		12¾	1	2¾	1 9	1¼	1	8¾	2	5	3	1
1/20		2¼		3¾	5	3/4	1	2¾	1	11	2 5	2	2	0¾	3	1	4	1
1/15		3¼		4¾	6¾	1	1	8¾	2	5	3 1	2¾	2	9	3	13	5	1
1/12		4		6	8	1¼	2	5	3	7	4 9	3	3	1	4	9	6	2
1/10		4¾		7¾	10	2	3	1	4	9	6 2	4	4	1	6	2	8	2
1/8		6		9¾	12	2¾	3	13	5	11	7 10	5	5	1	7	10	10	3
1/6		8		12	1 2	3	4	9	6	14	9 3	6	6	2	9	3	12	4
1/4		12¼	1	2	1 8	4	6	2	9	3	12 3	7¾	7	10	11	7	15	4
1/3	1	2	1	9	2 0¾	5	7	10	11	7	15 4	10	10	3	15	4		
1/2	1	9	2	5	3 1	6	9	3	13	12	18 5	15	15	4				
3/4	2	5	3	7	4 9	7¾	11	7	17	3	22 14							
1	3	1	4	9	6 2	10	15	4	22	14								
1¼	4	9	6	14	9 2	15	22	14										
2	6	2	9	3	12 3													
2½	7	10	11	7														
3	9	3																

PRONY BRAKE TESTING CHART For 60 cycle motors with 1, 2, and 3 ft. arms.

UNDERFLOOR VAT FOR OVEN

Large apparatus is "dunked" in the varnish vat. It is submerged right in front of the baking oven (see arrow) between tracks upon which a rolling platform is shoved in and out of the oven.



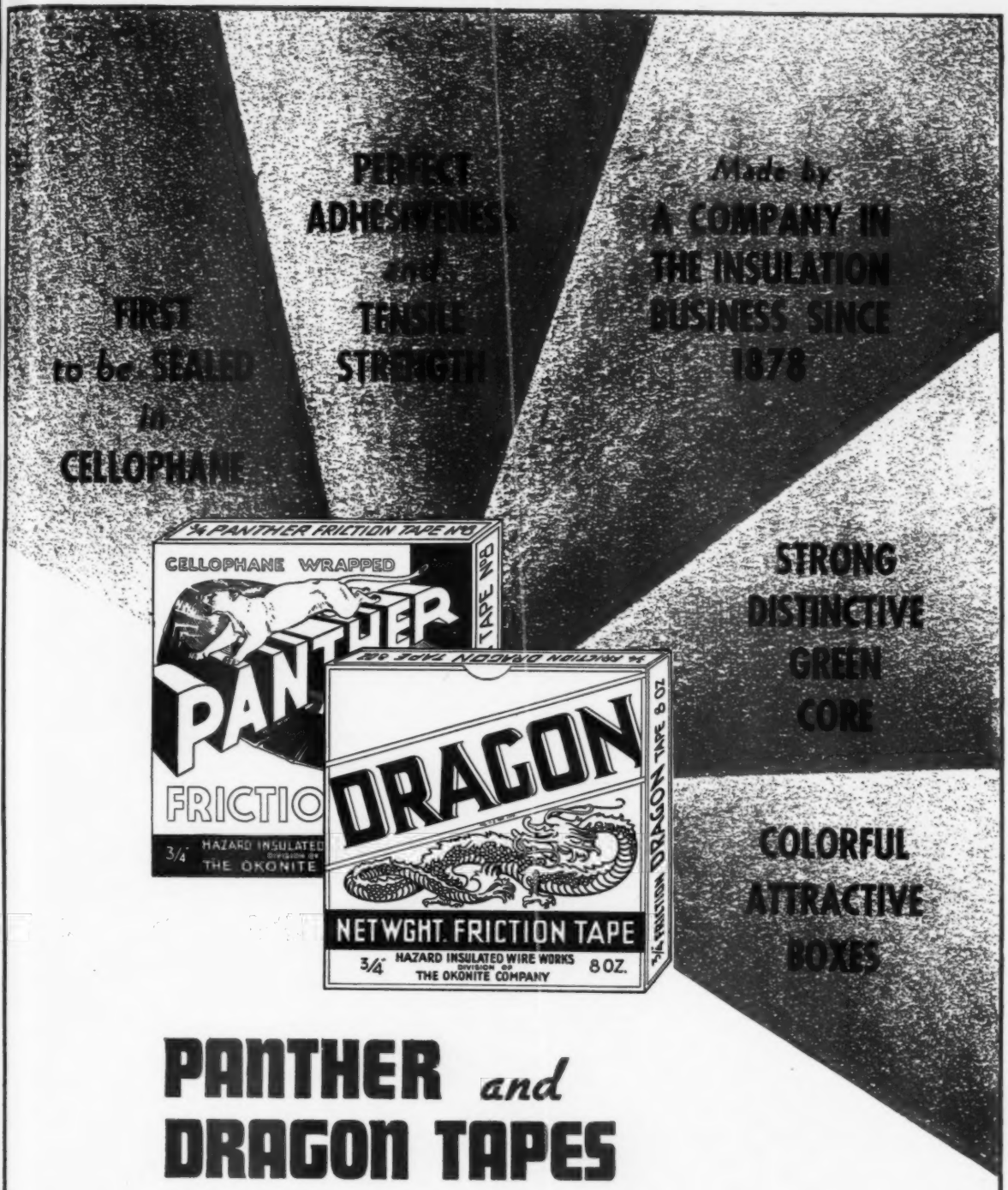
SUBMERGED DIPPING—Large apparatus is lowered into between-track varnish tank with travelling hoist, and rolled right into oven.

This arrangement was worked out during the recent remodelling of the H. N. Crowder, Jr. Company's shop in Allentown, Pa. The vat is in the floor directly beneath an overhead travelling hoist that extends for the length of the shop. This greatly simplifies the dipping process for heavy equipment. An adjustable spotlight was installed on the wall to light up the oven interior for quick identification of objects on bake.

ANTI-ALIBI FORM

When a business grows there come divided responsibilities, with important and sometimes confusing orders passing back and forth, between department heads. To keep from having misunderstandings about its routine affairs, the Fred Kiemle Company of Toledo, employs numbered memorandum forms upon which important orders or instructions are passed out. As printed the forms read "Verbal orders don't go."

For instance, the shop superintendent issues this memo order to the stockroom for special items of material or equipment that are to be ordered. Salesmen issue similar orders to the shop when they want a special service rendered at a certain date ahead. The manager uses this form for giving special instructions to the office, the sales force or to the shop. The order is written in duplicate with a lead pencil, and the order-giver keeps the carbon copy. Each set or pair of memo sheets bears a serial number, running consecutively by pairs. Printed in red ink on 5-in. by 8-in. white paper tablets, there are ten lines of space to write.



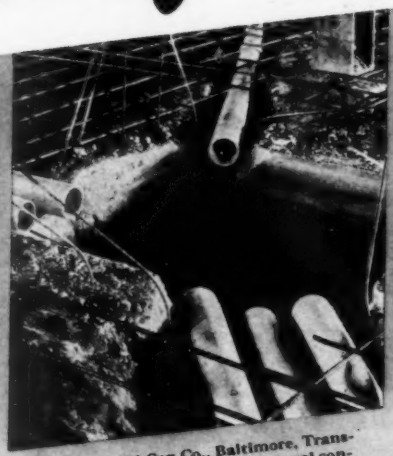
PANTHER *and* DRAGON TAPES

HAZARD INSULATED WIRE WORKS
Division of
THE OKONITE COMPANY
Factories: Wilkes-Barre, Pa. Passaic, N. J.

WE STILL MAINTAIN OUR ORIGINAL POLICY OF SELLING THESE TAPES THROUGH LEGITIMATE WHOLESALERS ONLY.

Everybody Saves WHEN

Weatherproof, permanent Transite Conduit on the Hendrick Hudson Memorial Bridge. Engineers: Madigan-Hyland, N.Y.C. Contractor: H. Z. Altberg, Inc., N.Y.C.



At Continental Can Co., Baltimore, Transite Conduit was enclosed in structural concrete; needed no special casing. Contractor: Kingsbury-Samuel Electric Co., Baltimore.

On this Federal Housing Project at Cleveland, Transite Conduit, without a concrete envelope, saved concreting costs. Contractor: Harrington Electric Co., Cleveland.

On this multiple-duct transmission system for the Dayton Power & Light Co., Dayton, Ohio, Transite was installed by Kelso-Wagner Co., Engineers.

In exposed locations, as here on the Marine Parkway Bridge between Brooklyn and Rockaway, Transite's corrosion resistance and permanence are important advantages.

The City of Los Angeles saved concreting costs by using Transite on this residential distribution line. Contractor: R. R. Jones Electric Co., South Pasadena.

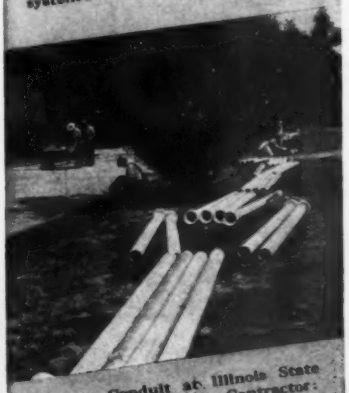
On the Lincoln Tunnel, where ducts are enclosed in concrete, the Port of New York Authority specified Transite Korduct. Contractor: Mason & Hanger Co., Inc., N.Y.C.

Transite Conduit installed within sidewalk slabs on East Bay Approach to San Francisco-Oakland Bay Bridge. Design Engineer: Glenn B. Woodruff. Contractor: Severin Electric Co., San Francisco.

TRANSITE DUCTS ARE USED!

Transite used by Chicago Park Board in a multiple-duct system on Chicago's Outer Drive. Contractor: Contracting & Materials Co., Chicago.

Inherently permanent, Transite was selected for the electrical distribution system of Omaha Airport.



Transite Conduit at Illinois State Hospital, Jacksonville. Contractor: E. A. Koeneman Electric Co., St. Louis.

On any distribution service, CONTRACTORS using these J-M Materials save through ease and economy of installation . . . CUSTOMERS save due to Transite's low first cost and virtual freedom from maintenance.

NATURALLY, you want to economize on your electrical distribution jobs. So do your customers. And with Johns-Manville Transite Conduit and Transite Korduct . . . you and your customers alike save money!

Why? Because these J-M Materials are asbestos-cement in composition. That means a strong, incombustible duct, and one of unusual durability and resistance to weather and corrosion . . . Qualities that enable Transite Conduit to go underground without an envelope, eliminating all "concreting-in" costs! . . . Or to be used in exposed locations with assurance of permanence and virtual freedom from maintenance.

When conduit is to be encased in concrete, Transite Korduct is the material to use. No need for Transite Conduit's extra strength in such cases. Korduct is made thinner walled . . . cutting material expense. And since Korduct, also, is resistant to corrosion, incombustible, proof against rot and decay—maintenance stays at an absolute minimum.

Adding to *your* savings, as a result of these features, are the light weight and long length of these two modern duct materials. That means your handling charges are always low. Moreover, the wide adaptability of Transite Ducts provides you with a ready answer to every service demand—no matter how tough—above ground and below.

* * *

For all the facts on Transite Conduit and Transite Korduct, send for our engineering-data sheets. You'll find they point the way to true duct economy. Write now to Johns-Manville, 22 East 40th Street, New York, N. Y.

JM Johns-Manville

TRANSITE CONDUIT

for use underground without concrete envelope and for exposed locations

TRANSITE KORDUCT

for installation in concrete

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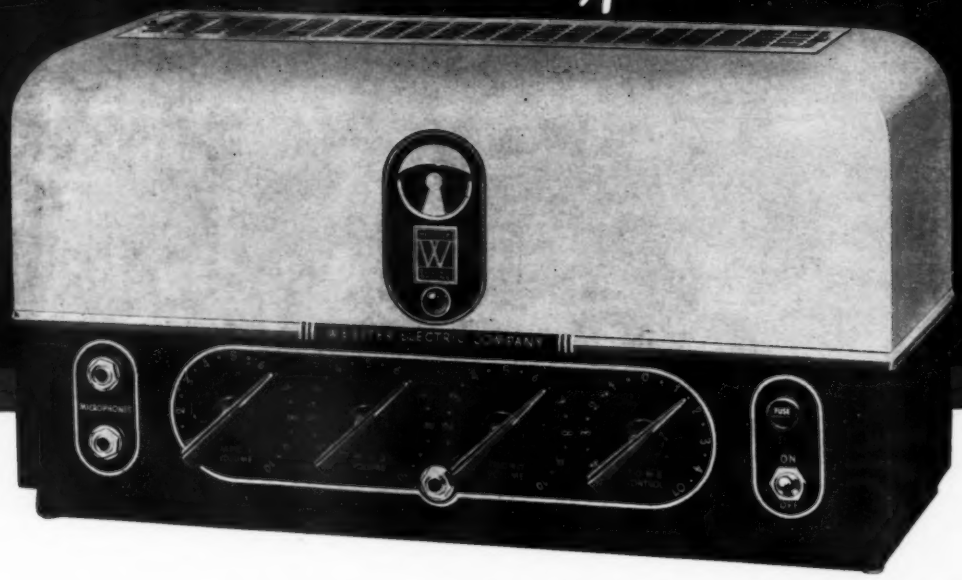
THE BETTER DISTRIBUTORS *Webster Electric* ARE "TAKING ON SOUND" . . .



● The definite market for sound which we have long predicted is now an actuality! The better distributors are "taking it on." And they are stocking Webster Electric Sound Equipment because it is the most modern in appearance; the most advanced in design; the most flawless in the character of its performance.

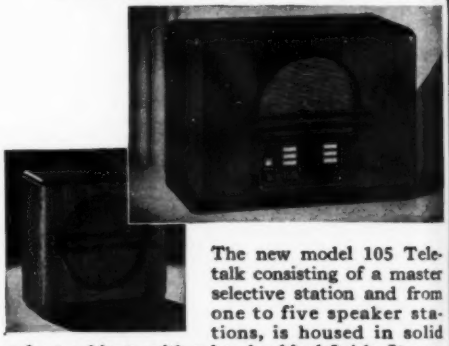
This trend is of the utmost importance to you, the electrical contractor. It enables you to secure portable and semi-portable systems right off your distributors' shelves. You secure sound equipment that is matched in all of its components and requires no engineering on your part. It provides you with a new outlet for labor and installation material.

Get into this new field. It has great profit potentials. Talk with your distributor about Webster Electric Sound Equipment—the World's finest. If your distributor has not yet received his stock, write us regarding it. In the meantime, send for the new Webster Electric Sound Equipment catalog and discount details.

Webster Electric Sound Systems are licensed by agreement with Electric Research Products, Inc., under patents owned by Western Electric Company, Inc., and American Telephone and Telegraph Company, Inc.

WEBSTER ELECTRIC COMPANY • RACINE • WISCONSIN • U • S • A •
Established 1909
Export Department—100 Varick Street, New York City
Cable Address "ARLAB" New York

. . . a New Model Teletalk at a Competitive Price



The new model 105 Teletalk consisting of a master selective station and from one to five speaker stations, is housed in solid walnut cabinets with a hand rubbed finish. It contains many new features in addition to the superlative Teletalk tone—*and it sells for no more than competing systems of lesser quality.* You can sell Teletalk. Let us tell you how.

Send for a sample of the new Webster Electric Pick-Up for Electric phonographs. It is new in design. New in appearance. New in the materials employed. New in performance standards. There is a profitable replacement market for it.

WEBSTER ELECTRIC RACINE

Webster Electric

PORTABLE AND SEMI-PORTABLE SOUND SYSTEMS • ELECTRONI
INTER-COMMUNICATING SYSTEMS • ELECTRIC PHONOGRAPH PIC
UPS • TRANSFORMERS AND FUEL UNITS FOR OIL BURNER

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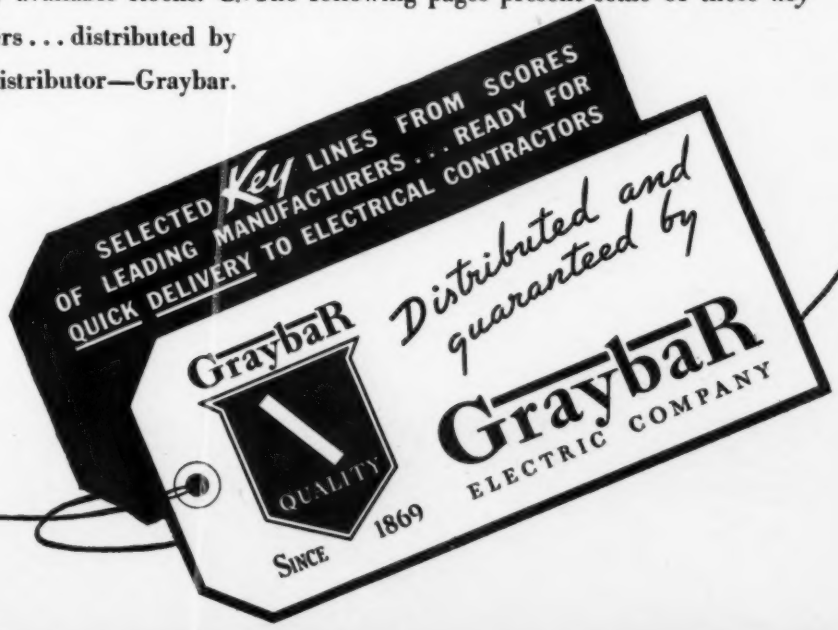
THE *Key* TO BETTER SALES

...BETTER PROFITS FOR ELECTRICAL CONTRACTORS

"What kind of a job did he do? What kind of materials did he install?" ¶ After the Electrical Contractor has completed a job, these questions are asked... not alone by his customer but by friends and business associates of that customer. ¶ In many cases, the answer determines the future business of the Contractor, for satisfied customers build business. ¶ Today, successful Contracting firms are building for better sales and better profits on the solid foundation of good installation of the selected *key* materials made by *key* electrical manufacturers. Furthermore, Graybar... the distributor... speeds up schedules by providing quick service from conveniently available stocks. ¶ The following pages present some of these *key* lines of *key* manufacturers... distributed by America's *key* electrical distributor—Graybar.


SELECTED Key LINES FROM SCORES OF LEADING MANUFACTURERS . . . READY FOR QUICK DELIVERY TO ELECTRICAL CONTRACTORS
GraybaR
QUALITY
SINCE 1869
Distributed and guaranteed by
GraybaR
ELECTRIC COMPANY

Offer The "Key" To Modern Raceway Installations

and we mean just this—

A Modern Raceway calls for speed and ease of installation, safety, and permanence. T & B Fittings were designed, and are constantly being redesigned, to keep the Contractor supplied with the best fitting for every job.

For example, the improved, tapered sleeve, mechanical lug (Tite-Bind) once made up tight it stays up tight. The armored cable connectors (Tite-Bites). The first watertight E.M.T. fittings and a revolutionary line of Service Entrance fittings.

Simple as some fittings may appear, T & B have found they usually can be improved.

It is this attitude that has kept The Thomas & Betts Co. out in front.

T & B has come to mean "The Best"—the "key" to Modern Raceway Installation.

a complete line with "contractor" thinking behind it

There are the "Tite-Bind" and "Hinjon" solderless connectors and the "Wedge-On" line of lugs, splicers and joints.

Then come "Tubelets" and Vaporproof fixtures. T & B Cast Iron Boxes, covers and gaskets are in a class by themselves.

Locknuts and Bushings of course. And Floor Boxes too.

Service Entrance Fittings for all raceways; Ground Fittings as well. Then there are fittings for armored cable; pipe and cable straps, hangers and supports, the bending tools and fish tape.

There are T & B Standard Rigid and E.M.T. (Thinwall) fittings.

About 33,000 different items all told.

We invite your request for a catalog listing this complete line.

T & B Fittings are listed under Re-examination Service of Underwriters Laboratories

THE THOMAS & BETTS CO.

General Sales Office and Factory ▼ 36 Butler Street, Elizabeth, New Jersey

ONE *Key* TO BETTER SALES AND PROFITS...

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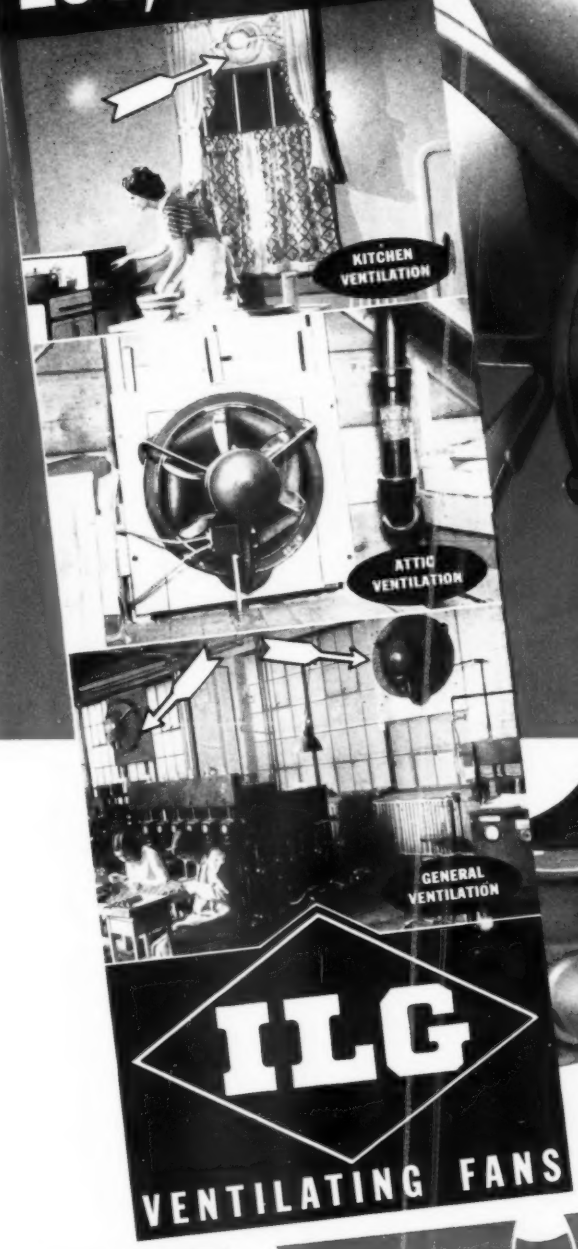
RECOMMENDED
To You by More Than
250,000 USERS



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VENTILATING FANS

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KITCHEN VENTILATION — Send for booklet illustrating and describing the complete line of Ilg Kitchen Ventilators for 1937. See the new Ilgette models, especially designed and priced for small kitchens.

ATTIC VENTILATION — Ask for pictorial bulletins featuring the Ilgattic System of cooling and ventilating homes, stores, public buildings, etc. Learn all about the new Ilgwind Fan.

GENERAL VENTILATION — Almost everything you want to know about ventilation in general is graphically explained and illustrated in the new Ilg Catalog — free upon request.

FULLY ENCLOSED SELF-COOLED MOTOR
CERTIFIED RATINGS
MORE AIR LESS POWER
GUARANTEED AS A COMPLETE UNIT

★ ILG ELECTRIC VENTILATING CO.
2879 N. CRAWFORD AVE., CHICAGO, ILL.

... BETTER INSTALLATION AND MAINTENANCE MATERIALS

Distributed and guaranteed by
GraybaR
GraybaR ELECTRIC COMPANY

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In Wiring Devices

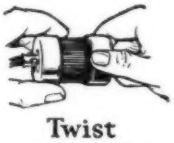
THE KEY TO BE

Hubbell *Twist-Lock* Devices

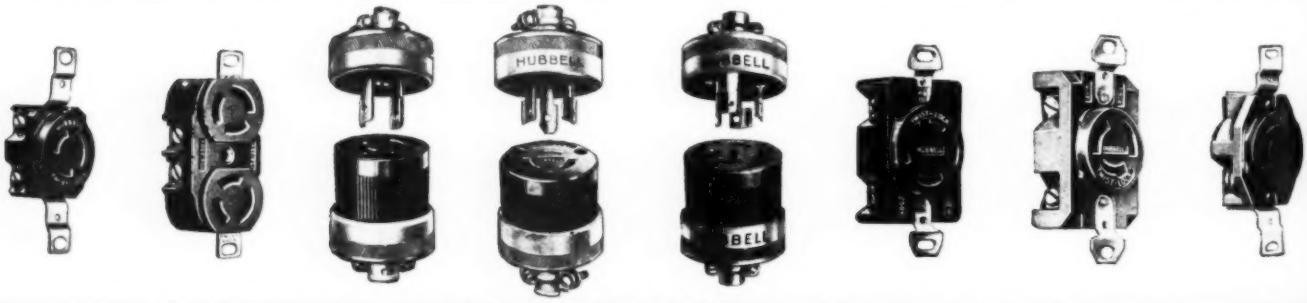
Plug in - and Twist

Since the advent of these Hubbell devices, Electrical Contractors have found a practical answer to many of the problems of their customers. And the answer has enabled them to build bigger and better sales and a more profitable service.

Twist-Lock Polarized devices insure positive protection against electrical hazards and disconnection delays. The cap is simply plugged in, twisted, and locked. Possibility of pulling out and breaking the connection is definitely eliminated. These devices are available in a wide variety of types for practically every home and industrial service involving plug-in connections.



Twist
and It's Locked



Graybar Quality — Distributed and guaranteed by Graybar Electric Company

ONE *Key* TO BETTER SALES AND PROFITS...

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BETTER SALES and BIGGER PROFITS IS-

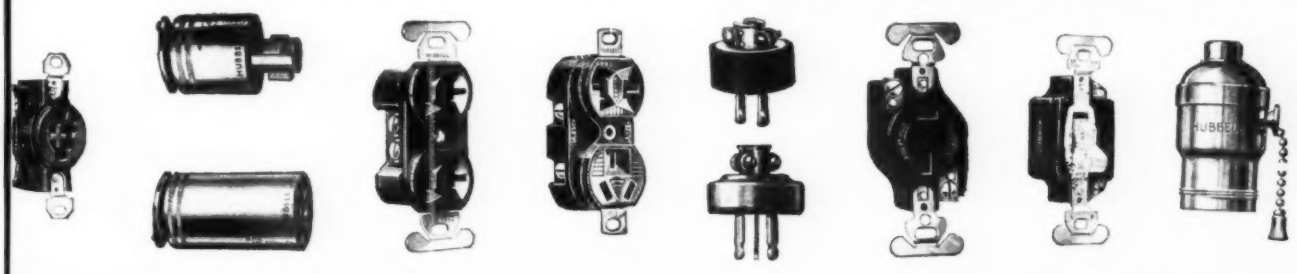
HUBBELL

REG. U.S. PAT. OFF

The name "HUBBELL" on a wiring device is your assurance of service-free operation in the hands of your customers.

These devices are built to meet modern requirements—improved, sturdy, electrically right for the purposes intended. Behind them stands "HUBBELL" for years a recognized leader among manufacturers serving every branch of the electrical industry.

HARVEY HUBBELL, INC., . . BRIDGEPORT, CONN.



...BETTER INSTALLATION AND MAINTENANCE MATERIALS

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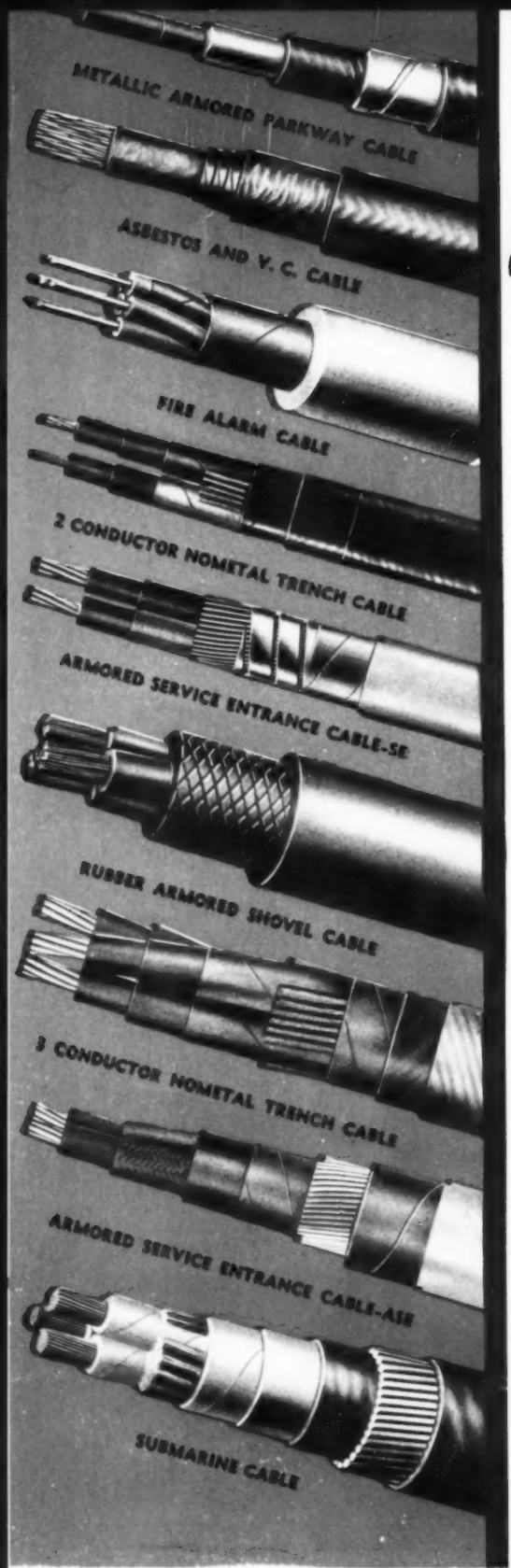
METALLIC ARMORED PARKWAY CABLE
ASBESTOS AND V. C. CABLE
FIRE ALARM CABLE
2 CONDUCTOR NOMETAL TRENCH CABLE
ARMORED SERVICE ENTRANCE CABLE-SE
RUBBER ARMORED SHOVEL CABLE
3 CONDUCTOR NOMETAL TRENCH CABLE
ARMORED SERVICE ENTRANCE CABLE-ASE
SUBMARINE CABLE

TEAMWORK

Distributed and guaranteed by GraybaR ELECTRIC COMPANY

ONE *Key* TO BETTER SALES AND PROFITS...

HABIRSHAW *and* GRAYBAR bring to you QUALITY WIRES *and* CABLES *—when and where you want them—*

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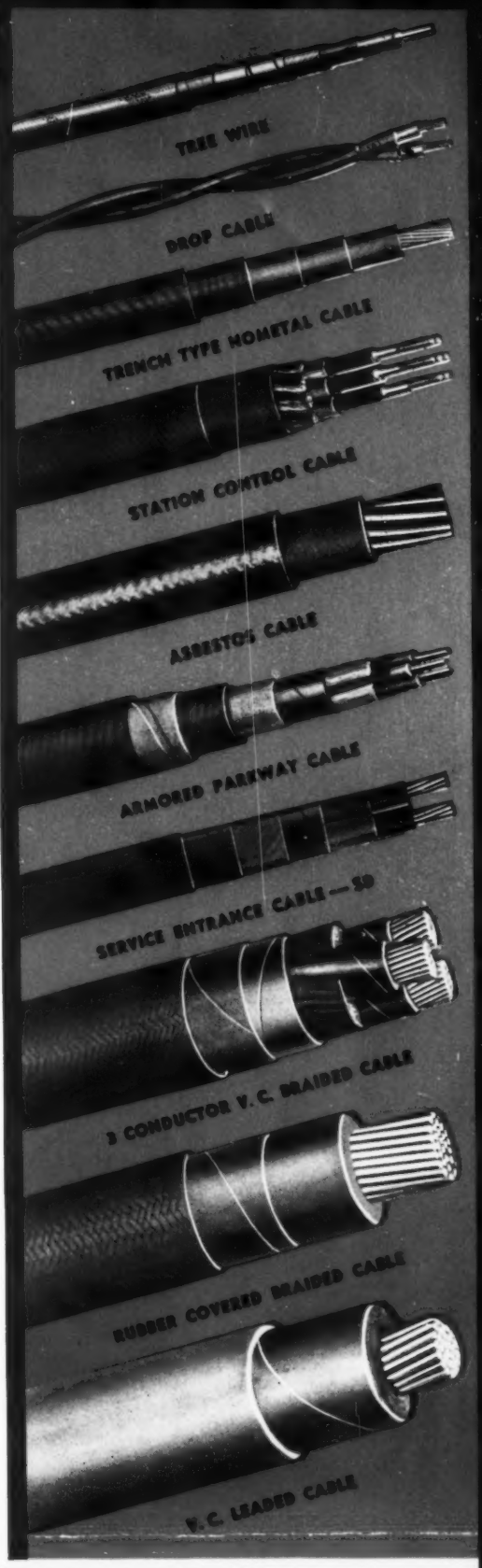

...BETTER INSTALLATION AND MAINTENANCE MATERIALS

GraybaR — Distributed and guaranteed by GraybaR ELECTRIC COMPANY

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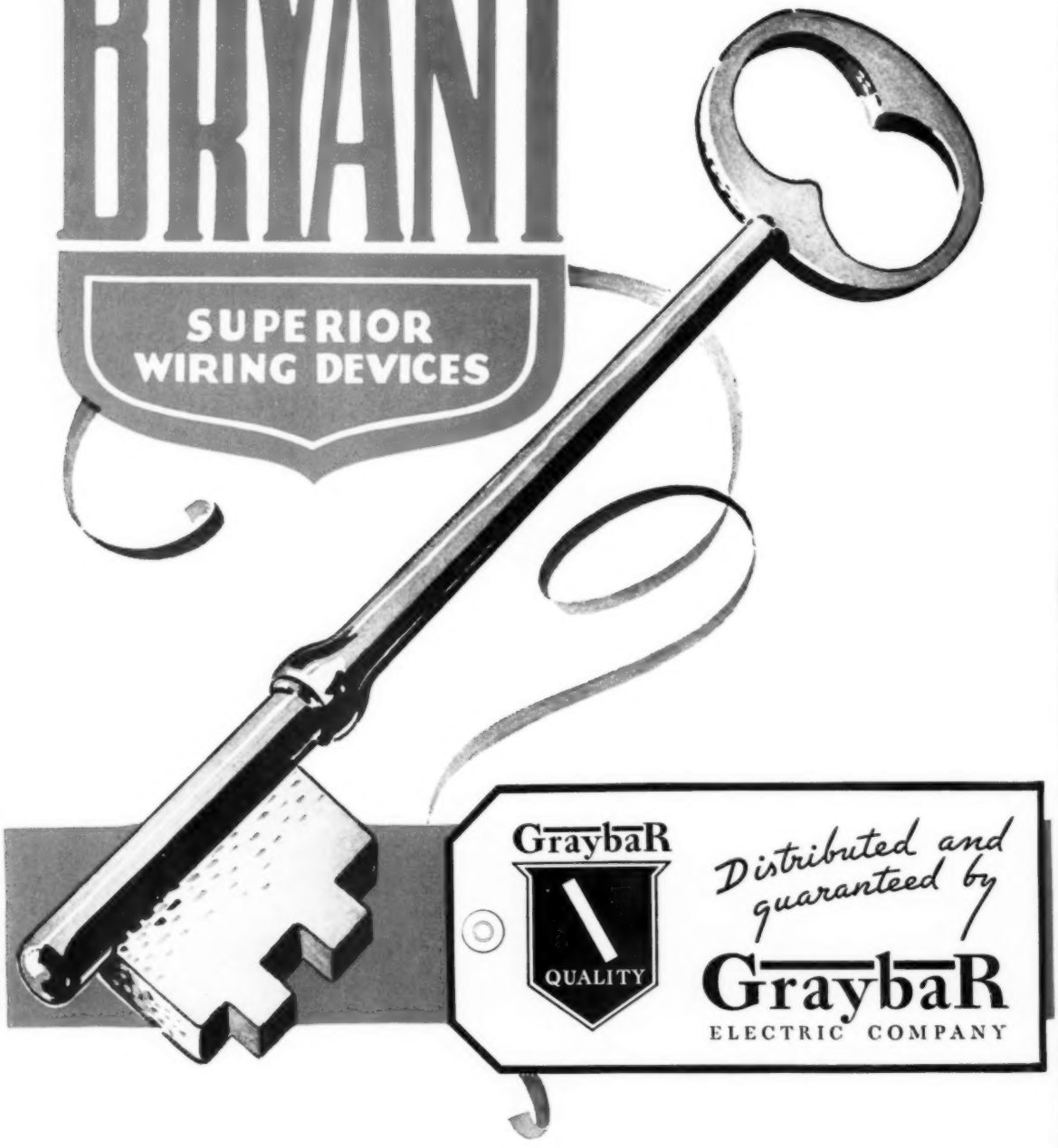
a MASTER KEY

BRYANT

SUPERIOR
WIRING DEVICES



ONE *Key* TO BETTER SALES AND PROFITS...

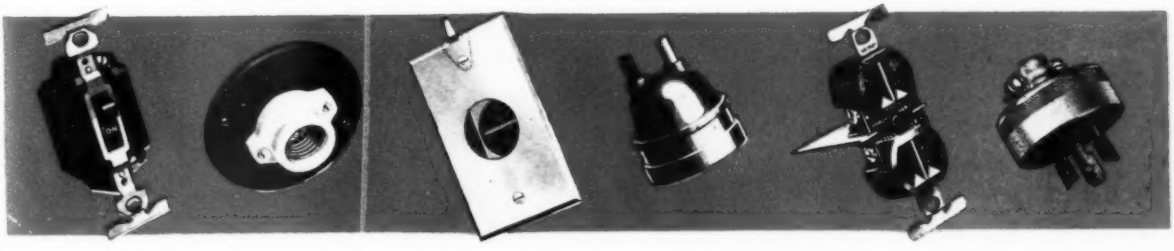
UMI

to MODERN WIRING NEEDS

The complete line of Bryant Wiring Devices with the complete service facilities of Graybar provide you a real Profit Opportunity

From the complete line of Bryant Wiring Devices you can select a device that exactingly meets specifications for every application, for every price and for every kind of job—residential, commercial and industrial. And through the extensive facilities of Graybar, you can be sure of prompt delivery from adequate stocks close at hand—a Graybar service on Bryant Wiring Devices that has extended over the past 48 years. Take advantage of this perfect combination of complete line and service facilities to profitably meet all modern wiring problems.

THE BRYANT ELECTRIC COMPANY



BRIDGEPORT, CONNECTICUT

NEW YORK	CHICAGO	SAN FRANCISCO
100 East 42nd Street	844 West Adams Street	325 Ninth Street

...BETTER INSTALLATION AND MAINTENANCE MATERIALS

Distributed and guaranteed by GRAYBAR ELECTRIC COMPANY

OPEN THE DOOR TO CUSTOMER SATISFACTION WITH GENERAL C

The General Cable line affords ultra modern products not only for house-wiring and commercial work but for your industrial business as well—the new Heat-Resisting V.C. CABLE, the one-and-only SUPER SERVICE, PEERLESS WEATHERPROOF, etc., etc.

Your Graybar Salesman will tell you all about them.

Graybar Quality — Distributed and guaranteed by Graybar Electric Company

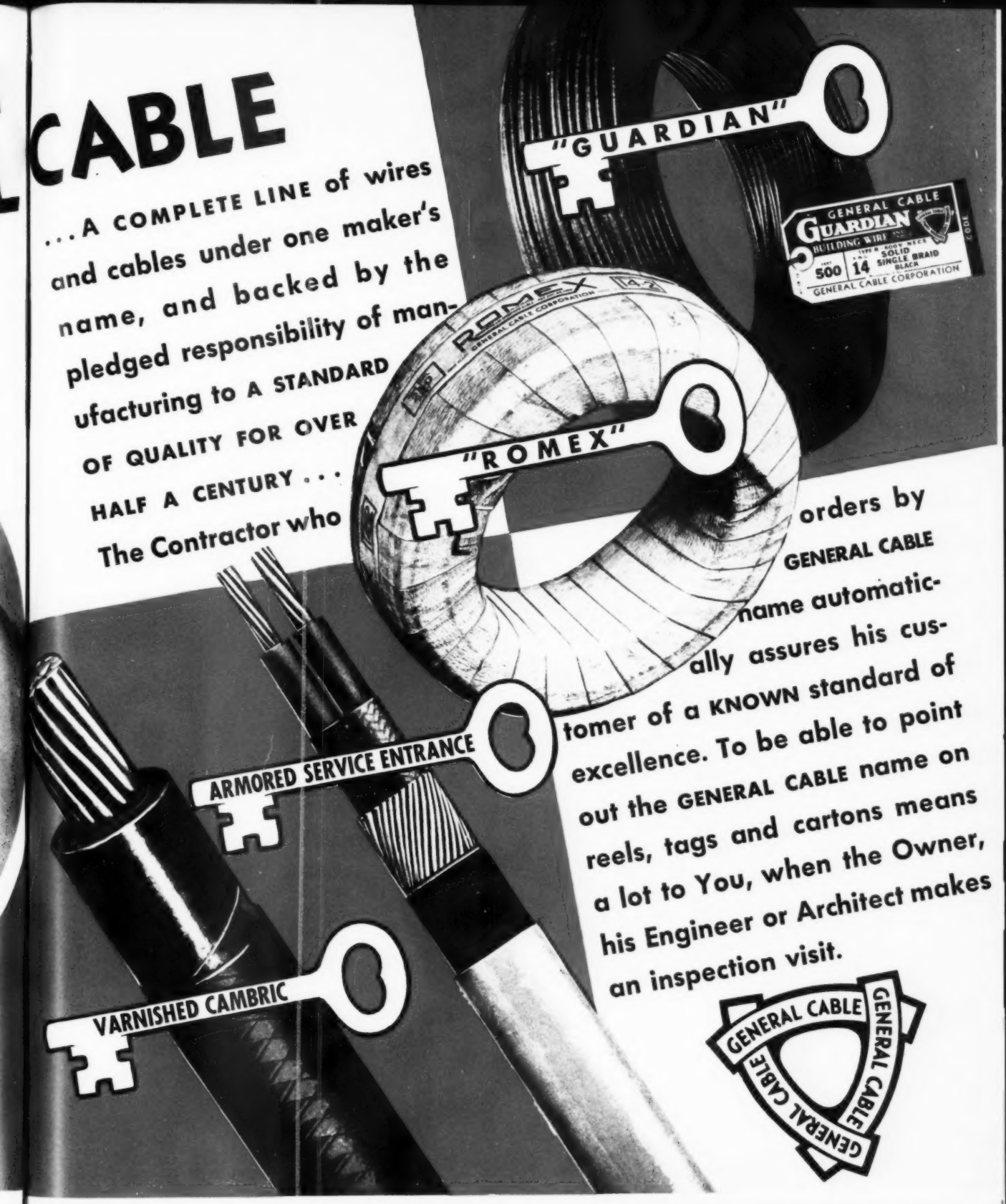
ONE *Key* TO BETTER SALES AND PROFITS...

UMI

CABLE

...A COMPLETE LINE of wires and cables under one maker's name, and backed by the pledged responsibility of manufacturing to A STANDARD OF QUALITY FOR OVER HALF A CENTURY...

The Contractor who orders by GENERAL CABLE name automatically assures his customer of a KNOWN standard of excellence. To be able to point out the GENERAL CABLE name on reels, tags and cartons means a lot to You, when the Owner, his Engineer or Architect makes an inspection visit.



GENERAL CABLE GENERAL CABLE GENERAL CABLE

...BETTER INSTALLATION AND MAINTENANCE MATERIALS

Distributed and guaranteed by GraybaR

UMI

NO OTHER RACEWAY FOR WIRING CAN GIVE YOU *all* THESE FEATURES

- Cold-Rolled Open-Hearth Steel
- 100% Electric Resistance Weld
- Adequate Protection
- Light Weight
- Easy to Cut
- Easy to Bend and Rebend
- No Threads
- 3 Simple Fittings
- Knurled Inside Surface
- Uniform Corrosion-Resistance
- Easy to Install
- Universal Acceptance
- Low Cost
- Widespread Distribution
- Assistance of a Field Force

HERE'S HOW...

To Cut Ho... WITH THIS HER...

ELECTRUNITE Steeltubes S...

Reg. U. S. Pat. Off.

MORE THAN 150,000,000 FEET INSTALLED

Graybar — Distributed and guaranteed by Graybar Electric Company

ONE *Key* TO BETTER SALES AND PROFITS...

UMI

Your Strokes

ER RACEWAY FOR WIRING

How many strokes it will take to cut ELECTRUNITE Steeltubes depends upon your skill with a hacksaw. But one thing is certain: because of the lighter, uniform wall and the ductility of the open-hearth steel, you'll need less strokes than when cutting ordinary conduit.

No vises are needed. Merely hold ELECTRUNITE Steeltubes in one hand and a 32-tooth hacksaw in the other. The cut is quickly and cleanly made with practically no burr. The ends may be reamed with a file, pocket knife or plier handles.

Ask your wholesaler to send out the Steeltubes man with his "bag of tricks."

USE YOUR PLIER HANDLES — that's the simple way to ream the cut ends of this easy-to-install modern raceway.

* * *

Knurled inside finish (Patent No. 1,962,876) available in ½", ¾" and 1" sizes.

ELECTRICAL DIVISION

Steel and Tubes, Inc.

WORLD'S LARGEST PRODUCER OF ELECTRICALLY WELDED TUBING

CLEVELAND . . . . OHIO

REPUBLIC STEEL

...BETTER INSTALLATION AND MAINTENANCE MATERIALS

Graybar — Distributed and guaranteed by Graybar

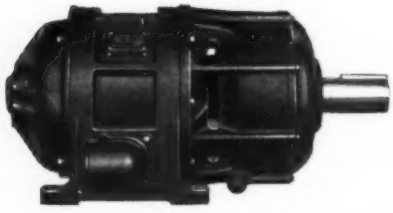
UMI

Like adding an hour to the working day

G-E squirrel-cage induction motors mean savings for you and your customers on general purpose jobs

This compact G-E magnetic switch for use with a push-button station gives complete motor protection

G-E manual starting switches give reliable overload protection for a-c motors up to 7½ horsepower



Where you require a quiet, efficient, low-speed drive, use a compact General Electric gear-motor

WHEN you can get nine hours of work done in an eight-hour day, it's like so much money in your pocket. But that's essentially what happens when you use G-E motors and control on your jobs. You actually gain extra time—both you and your installation men—because G-E motors and control are easy to select and apply, easy to install, easy to service.

Look at these features of G-E induction motors that help to make your job easier: roomy conduit box, no-solder terminals, and a connection diagram on every motor to help you make connections quickly; knockoff ledge for easy disassembling; solid feet to make doweling a simple task.

And the G-E controls for these motors save you time, too. Overload relays are already adjusted to the characteristics of the motor. Installation is a simple matter because these switches are easy to mount and convenient to wire. Servicing—when it does become necessary—is readily accomplished.

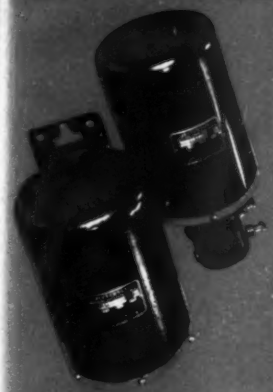
Next time you're laying out a job, find out how the right combination of G-E motors and control will save you time and money. For complete information, address either the nearest office of the Graybar Electric Company or General Electric Company, Schenectady, N. Y.

020-336

GENERAL ELECTRIC

Distributed and guaranteed by Graybar

ONE *Key* TO BETTER SALES AND PROFITS...



At left—weather-proof pole mounting type Mercury Lamp Transformer.

Below—Indoor wall mounting or fixture suspension type Mercury Lamp Transformer.

Above—Weather-proof wall mounting type Mercury Lamp Transformer.

Below—Renewable Fuses made in ferrule and knife-blade types, in all capacities.

TRANSFORMERS and FUSES

You Can Depend on Jefferson Quality

The quality of Jefferson products is the result of rigid material specifications and close tolerances—combined with efficient supervision of manufacturing operations—and supported by outstanding engineering talent and experience.

Jefferson Mercury Lamp Transformers insure continuous satisfactory operation, with the inherent advantages of coolness, quietness and efficiency. Added features are:

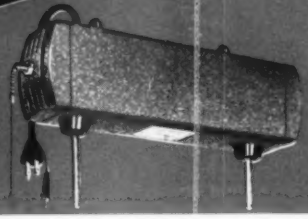
- **Neatness and Compactness**
- **Facilities for mounting in any position**
- **Roomy wiring compartments**
- **Combination Wall Mounting and fixture suspension unit**
- **Furnished with clamps for messenger wire support**

Jefferson-Union Renewable Fuses have served the electrical industry since its earliest days. Precision craftsmanship, advanced engineering, built-in accuracy,—combined with simplicity and ruggedness have made Jefferson-Unions the first choice of experienced electrical men.

Jefferson Luminous Tube Transformers, in their new finish and streamlined design, accommodate themselves to modern styles in both indoor and outdoor applications. Mid-Point Grounded Balanced Design—a patented feature—has made possible more efficient luminous tube operation and longer life of tubing and all electrical parts—and uniform brilliance. Secondary voltages and currents are balanced and limited and Jefferson Transformers have the added features of low internal temperatures and "low-loss", non-aging cores.

The widespread knowledge of Jefferson Leadership in design, quality and manufacturing facilities has made Jefferson Products the choice of discriminating buyers everywhere.

Jefferson Luminous Tube Transformer for exterior signs and luminous tube illumination spectaculars.



Jefferson Luminous Tube Transformer—Indoor Type—furnished for various mountings—beautifully finished.

JEFFERSON ELECTRIC COMPANY

BELLWOOD (Suburb of Chicago) ILLINOIS

Canadian Factory: 525 College Street, Toronto, Ont.

...BETTER INSTALLATION AND MAINTENANCE MATERIALS

Distributed and guaranteed by Graybar Electric Company

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BENJAMIN LIGHTING EQUIPMENT

the key to better INDUSTRIAL RELATIONS

Illustrated in the panel above are typical Benjamin Lighting Reflectors used to secure General and Specific Location Lighting. Complete descriptions are to be found in Catalog No. 26.

Today, no phase of factory management is being given greater attention by the industrial executive than industrial relations. The part played by modern Benjamin factory lighting in furthering better industrial relations is therefore of paramount interest to management.

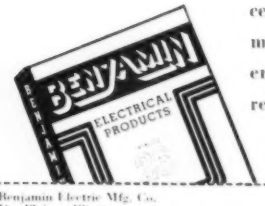
Unless the executive has thoroughly investigated the bearing of lighting upon industrial relations, he is certain to be surprised by the many ways lighting can influence and improve industrial relations.

Benjamin general and specific location lighting is the culmination of years of engineering effort to provide specially designed reflectors which deliver not only *sufficient* light but the *right kind* of light for every "seeing" requirement.

Benjamin's complete line of standard types and latest specialized types of lighting equipment, provide the last word in both general and specific location factory lighting. If you do not have the Benjamin Catalog No. 26, return of the coupon will bring you one by return mail.

Benjamin Modernized Factory Lighting Is a Fundamental Factor in Industrial Relations

It conserves the worker's eyesight, thus prolonging his period of high earning capacity. It minimizes fatigue thus contributing to an alert, healthy mind and body. It protects him from accidents. It removes eyestrain, cause of "nerves" and irritability. It contributes to a cheerful working atmosphere, lightens the job, makes the factory a place where workers prefer to be employed.



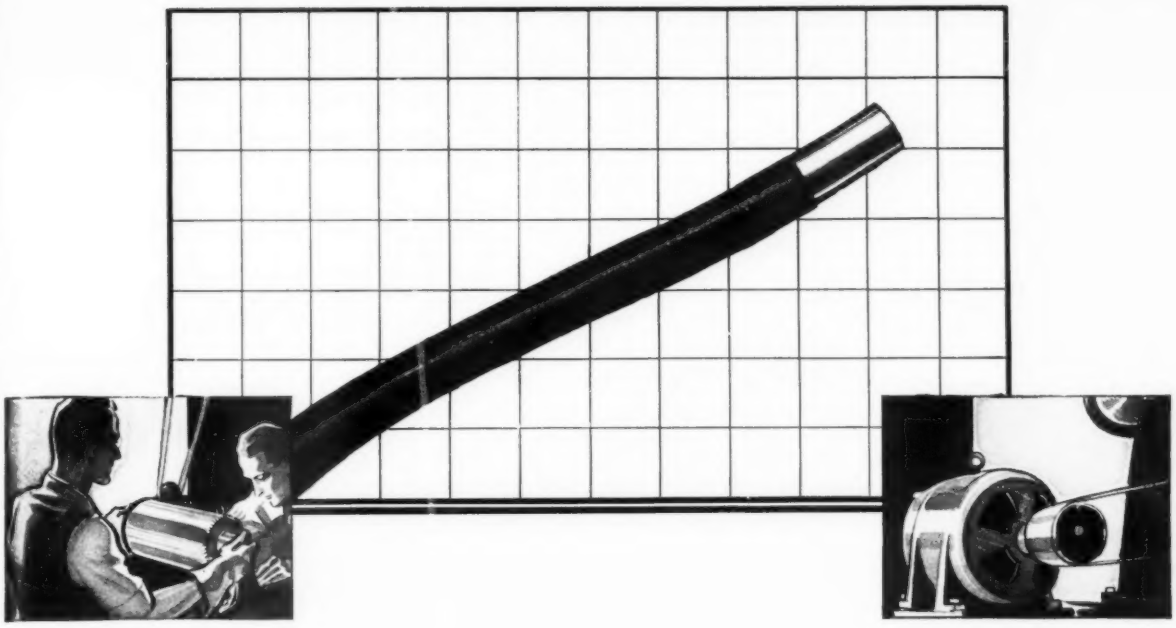
Benjamin Electric Mfg. Co.
Des Plaines, Illinois
RUSH CATALOG No. 26
Name
Address
City State

Benjamin Lighting Equipment is distributed exclusively through Electrical Wholesalers

Graybar Quality — Distributed and guaranteed by Graybar Electric Company

ONE *Key* TO BETTER SALES AND PROFITS...

NEW RECORDS FOR LASTING MOTOR SERVICE . .



BECAUSE DELTABESTON MAGNET WIRE IS DEPENDABLE

Electrical Contractors recommend the use of Deltabeston Magnet Wire for rewinding all types of motors. They can prove that this asbestos-insulated wire increases production, by reducing breakdowns.

Motor coils wound with this rugged, heat-resisting magnet wire will deliver plus performance . . . year after year. Heat, generated by momentary or prolonged overloads, does not affect Deltabeston Asbestos insulation. Years of outstanding service are assured.

Your customers will appreciate the uninterrupted service given by a Deltabeston-wound Motor. Urge them to specify Deltabeston Magnet Wire for replacement. Deltabeston is used by leading motor manufacturers.

Write for complete information. Address SectionX-8810, Appliance and Merchandise Dept., General Electric Co., Bridgeport, Conn. Deltabeston Wire and Cable is distributed by General Electric Merchandise Distributors and the Graybar Electric Company.

GENERAL ELECTRIC

DELTABESTON WIRE AND CABLE

APPLIANCE AND MERCHANDISE DEPARTMENT, GENERAL ELECTRIC COMPANY, BRIDGEPORT, CONN.

. . . BETTER INSTALLATION AND MAINTENANCE MATERIALS

Distributed and guaranteed by GRAYBAR ELECTRIC COMPANY

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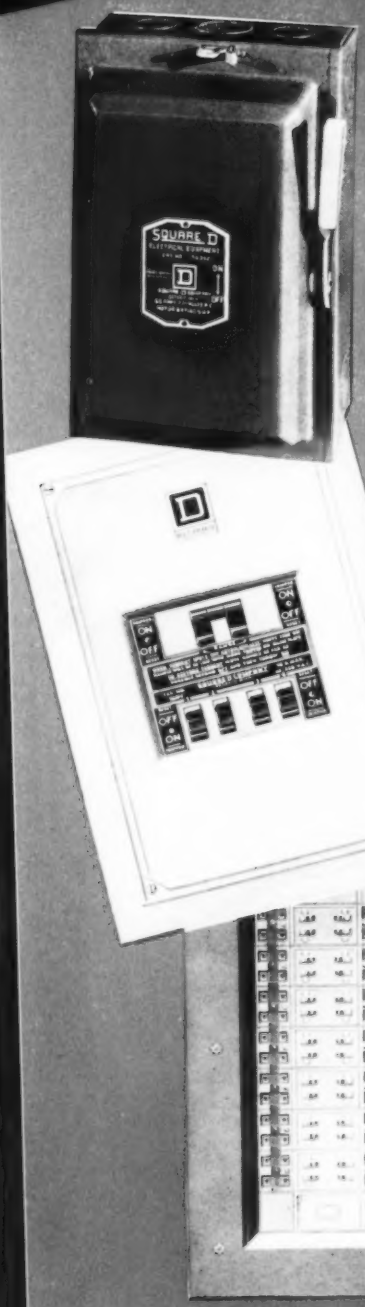
BE *Trouble-Free* WITH SQUARE D DEPENDABLE EQUIPMENT



SAFETY SWITCHES
Safety switches for every type of industrial, commercial and domestic requirement.

MULTI-BREAKER
The new low cost form of circuit breaker for non-industrial use. This device is made in several standard forms including panelboards and reinlight enclosures.

PANELBOARDS
Fuse type and circuit breaker panelboards for power and light control.

- You will find dependable Square D electrical equipment everywhere—wherever power is used or lights are controlled.
- In industry, Square D switches, panelboards and circuit breakers reduce production delays.
- In homes and on farms, the Square D MultibreakeR adds comfort and security.
- Electrical equipment is trouble-free when it bears the Square D name plate.
- Square D pioneered the safety switch. Its engineers are daily seeking new ways and means for the more efficient use of power and the distribution of light.
- When you seek dependable, trouble-free electrical equipment, say "Square D."

SQUARE D COMPANY
DETROIT - MILWAUKEE - LOS ANGELES
SQUARE D COMPANY CANADA LTD. TORONTO, ONTARIO

Distributed and guaranteed by GraybaR ELECTRIC COMPANY

ONE *Key* TO BETTER SALES AND PROFITS...

EVERSTICK ANCHORS...

SUPREME IN HOLDING POWER

The Everstick Nut Housing illustrated below locks Anchor firmly on rod and prevents rod from slipping thru while Anchor is being installed.

AN EXCLUSIVE EVERSTICK FEATURE

In Pole Line construction and maintenance Everstick Anchors are preferred by engineers and crews everywhere. Fast installation plus super holding power are the qualities that have created Everstick preference. Made of malleable iron—Eversticks are tough—dependable and rust resistant. Their use in all construction including new R.E.A. lines insures long service without continuous maintenance expense.

EVERSTICK 3-WAY

The ideal Guy Anchor for all construction and replacement work. Quick installation—easy to expand.

3-WAY EXPANDED

When expanded, plates completely cover every point in solid earth.

EVERSTICK 4-WAY

A heavy duty Anchor for heavy guying strains. Large holding area—yet easy to expand.

EVERSTICK 2-WAY

Widely used in lighter guying. A dependable Anchor with all Everstick features.

EVERSTICK CONE ANCHOR

Improved rigid type with Everstick Nut Housing feature.

EVERSTICK ANCHOR COMPANY, FAIRFIELD, IOWA

...BETTER INSTALLATION AND MAINTENANCE MATERIALS

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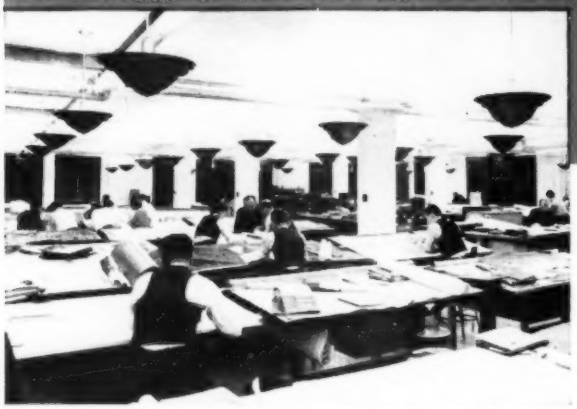
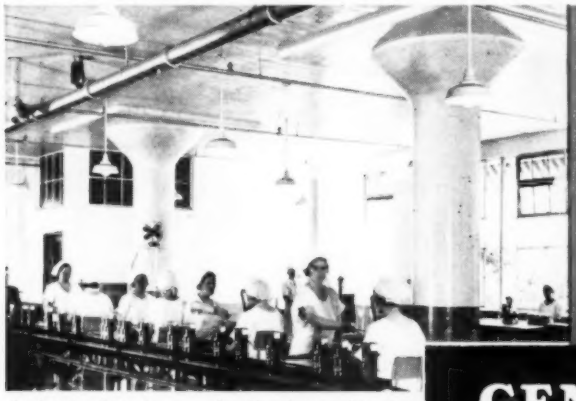
LIGHT CONDITIONING

. . . the new approach to sell LIGHTING



When a rush of work at the Curtiss Aeroplane & Motor Company's Buffalo plant necessitated more work from the design department, the men complained of headaches and eyestrain. Light Conditioning solved the headache problem and satisfied employees.

When Loehr & Klute's Richmond, Ind. clothing store was remodeled, it was also light conditioned. In the modernized store there are thirty-one footcandles of evenly distributed light and sales are up approximately 40%! Light Conditioning helps stores step up sales.



Light Conditioning at the Beech-Nut Packing Company's Canajoharie, N. Y. plant helps maintain uniform, high quality products as well as employee morale. In this photo, the girls are packing and weighing macaroni. Good lighting helps them read the scales accurately.

Light Conditioning offers electrical contractors a new approach in selling commercial and industrial lighting. Briefly, it means providing the right amount of light and the right kind of lighting wherever eyes are used indoors for close seeing tasks.

Lowered production costs, less spoilage, fewer errors, reduced accident hazards and better employee morale are some of the benefits traceable to light conditioning.

Your local electric service company undoubtedly has a staff of lighting experts who will gladly cooperate with you in light conditioning stores, offices, and factories in your locality. And when you do install light conditioning, be sure to use the new and brighter G-E MAZDA lamps and give your customers the advantage of the most recent improvements in lamp manufacture. General Electric Company, Dept. 166, Nela Park, Cleveland, Ohio.

MEASURE LIGHTING WITH LIGHT METER

A lighting survey is one of the first steps toward light conditioning. The General Electric Light Meter measures light as simply as a thermometer measures temperature. With one of these instruments you can quickly measure the lighting. Costs only $11.50.

GENERAL ELECTRIC MAZDA LAMPS

Distributed and guaranteed by GRAYBAR

ONE *Key* TO BETTER SALES AND PROFITS...

Trumbull POINTS *with* PRIDE

to the REAL VALUES *of this* LOW COST TYPE "D" LIMITED DUTY SWITCH

When operated under conditions and for the duties for which it was designed, The Trumbull Front Operated Type D Enclosed Switch will provide satisfactory service at extremely low cost.

No. 22201, shown below, is of 30 ampere, 125 volt capacity, with plug fuses and porcelain base. The steel box is $3\frac{11}{16}$" x 6" x 3" deep - with plenty of room for wiring. Rated in amperes only - 30 to 100, slow make and quick break; 200 to 400 amp., quick break. No fuse or fusible, single throw only. Note the features detailed below.

THREE GENERAL PURPOSES

(1) For controlling motors, 115 volt, single phase or Direct Current. (2) For controlling heavy duty lighting circuits. (3) On domestic and industrial heating devices.

Particular Uses. They can be mounted as a unit or in connection with Oil Burners, Air Compressors, Refrigerators, Vacuum Cleaners, Flood Lights, Sign & Grounds Lighting, General Lighting Circuits, and for Entrance duty on small detached buildings. All miscellaneous use where fusing is desired.

❶ *uble - Break Contacts. rc snuffed in recesses in rcelain base.*

❷ *nt operation. New terial makes handle n-warping. Steel boxes, n-interlocking cover.*

❸ *ry Compact. rminals and Fuses sily accessible.*

❹ *Ample Wiring room. Entire unit easily removable from box.*

❺ *Can be locked in either "On" or "Off" position. Provisions for sealing cover.*

❻ *Top ends with knockouts for conduits or twistouts for meter use.*

The TRUMBULL ELECTRIC MFG. CO.

LAINVILLE — A GENERAL ELECTRIC ORGANIZATION — **CONNECTICUT**

Chicago • Boston • Detroit • Nashville • Atlanta • Philadelphia • Ludlow, Ky. • San Francisco, Cal. • Los Angeles, Cal. • Seattle, Wash.

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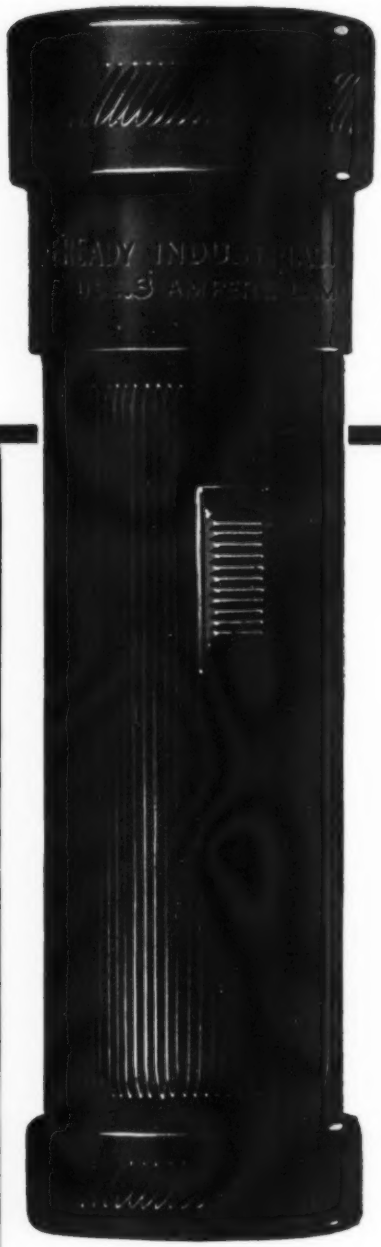
It's TOUGH!



YOU PRACTICALLY CAN'T BREAK IT! Heave it on a concrete floor and its beam won't even flicker.

IT WON'T DENT, SCRATCH OR SHOW SIGNS OF WEAR.

ACIDS, ALKALIES WON'T AFFECT ITS FINISH.

IT'S COMPLETELY INSULATED. No metal on outside of case—can be safely used around "hot" wires.

THE "EVEREADY" INDUSTRIAL FLASHLIGHT

TWO SIZES:

The 2-Cell

The 3-Cell

THE "EVEREADY" "IGNITOR"

For years the outstanding all-purpose dry cell. Long a universal favorite, it stands the test, year after year, in all kinds of jobs.

The words "Eveready" and "Ignitor" are Trade Marks of the National Carbon Co.

NATIONAL CARBON COMPANY, INC.
GENERAL OFFICES: New York, N. Y.
BRANCHES: Chicago • San Francisco
Unit of Union Carbide UCC *and Carbon Corporation*

ONE *Key* TO BETTER SALES AND PROFITS...

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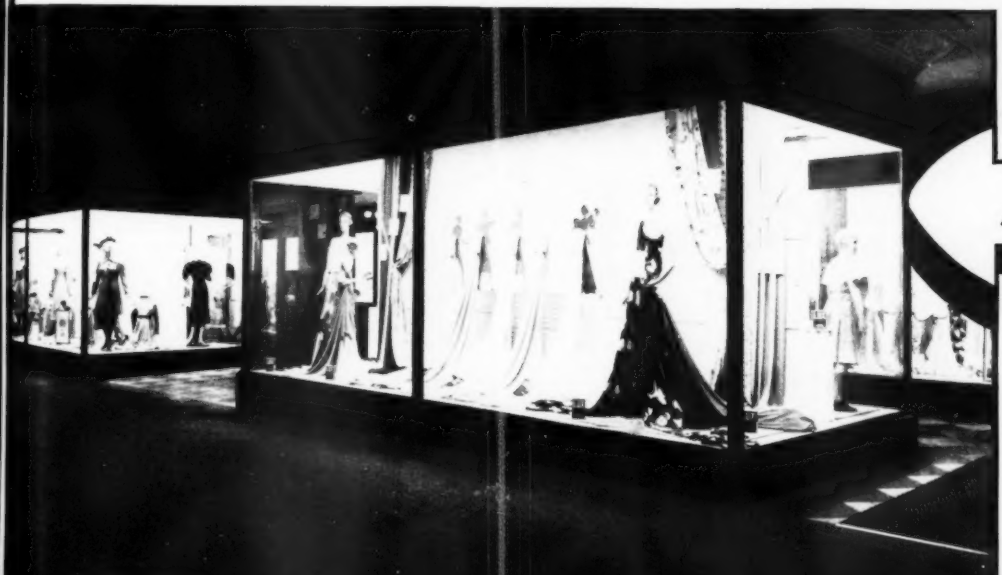
DULL, DRAB
DISPLAY
WINDOWS

BEFORE

FAIL
TO MAKE
PROFITS

the same MODERN *show windows*

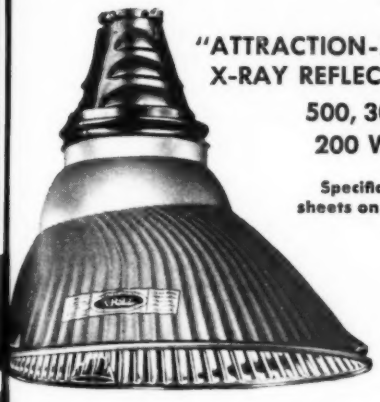


BRILLIANTLY
LIGHTED . . .

AFTER

ATTRACT..
APPEAL...
AND SELL!

X-Ray TRADE MARK REG. "ATTRACTION-ZONE" LIGHTING



"ATTRACTION-ZONE"
X-RAY REFLECTOR
500, 300 or
200 Watts

Specification
sheets on request

BUILDS SHOW WINDOW SALES

Take a tip . . . spend today calling on "dull" show windows. Every merchant has money invested in street frontage and is interested in means of increasing show window sales. X-Ray "Attraction-Zone" lighting does just that . . . boosts attention and sales value of *every* show window . . . makes money for you *and* your customer.

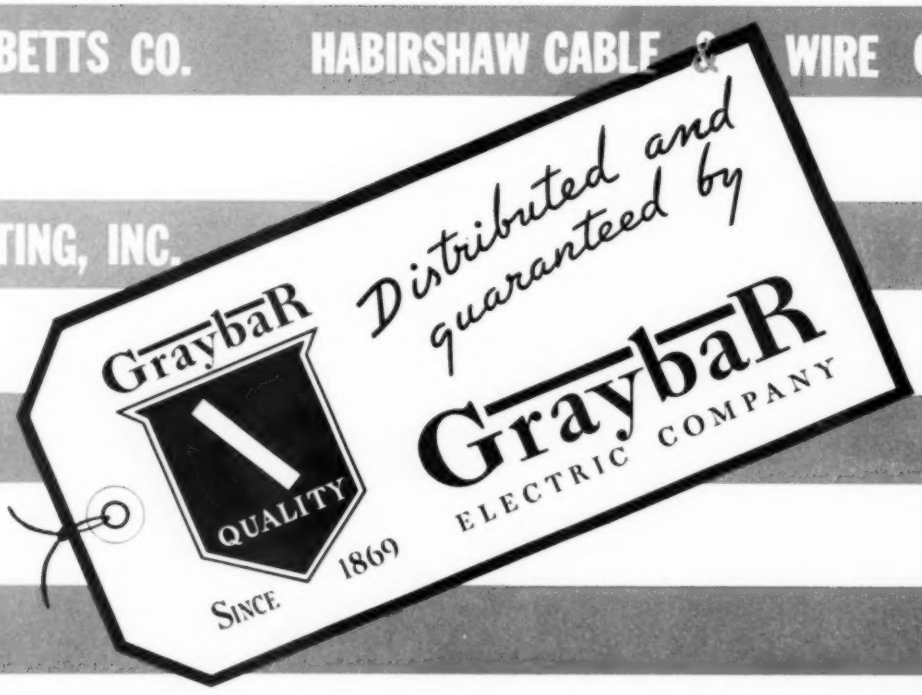
Curtis Lighting, Inc.

New York CHICAGO Toronto

Representatives in All Principal Cities

UMI

STEEL & TUBES, INC.
BENJAMIN ELECTRIC MFG. CO.
BRYANT ELECTRIC CO.
GENERAL CABLE CORP.
GENERAL ELECTRIC COMPANY
HARVEY HUBBELL, INC.
JLG ELECTRIC VENTILATING CO.
NATIONAL CARBON CO., INC.
EVERSTICK ANCHOR CO.
JEFFERSON ELECTRIC COMPANY
TRUMBULL ELECTRIC MFG. CO.
SQUARE D COMPANY
THOMAS & BETTS CO.
HABIRSHAW CABLE & WIRE CORP.
CURTIS LIGHTING, INC.



UMI

Those Laws Help Contractors

[FROM PAGE 16]

property owners for the inspections.

The department is under the administration of the Oregon Department of Labor, and the chief inspector is W. R. Volheye, with headquarters in Portland. Utilities report meter sets to the department, against which are checked the duplicates of tags placed on the completed job by the contractor. Such jobs are inspected on the next trip of the inspector to the district. Cities having ordinances and inspection departments do not come under the jurisdiction of the department.

California's law is not for inspection. Rather it licenses and regulates the business practices of contractors, and covers all classes of contractor—of which there are 90 listed on the application, including speculative builders. It is more like the licensing of doctors and dentists; indeed the law is administered under the Department of Professional and Vocational Standards. A board of seven contractors of various classifications, selected by the governor, administers the act with a registrar who supervises the 23 field inspectors. For the second time, an electrical contractor, Roy Butcher, of San Jose, has been selected as chairman of this board.

The Deadly Sins

A license may be revoked or suspended and without it a contractor cannot engage in business in the state. Grounds for action against the contractor may be—

(1) Abandoned a project without legal excuse,

(2) Diverted funds, received for a part or all of the work, to another job or himself,

(3) Departed from plans and specifications,

(4) Disregarded building or safety laws of the state or locality or of labor or compensation laws,

(5) Failed to keep records of all transactions, in respect to a project, by which his accounts may be inspected for cause,

(6) Misrepresented a material fact in making his application,

(7) Failed to complete for the price stated in the contract,

(8) Aided or abetted an unlicensed person to evade the act, allowing his license to be used by another,

(9) Failed to comply with the provisions of the act.

At the last legislature the act was further strengthened to permit the board to set up prequalifications before granting a license. The exemption clause was reduced in amount from $200 jobs to those wohse total, for all classes of work on the project, is $100 or more. Work on farms by contractors is brought under its jurisdiction. The prequalification amendment allows the board to require a reasonable amount of experience, a general or basic knowledge of the building, safety, health and lien laws, and the applicant to show a knowledge of "rudimentary administrative principles" of the contracting business.

Seven Sponsors

The applicant must show possession of good character, and the new application form provides for references from seven sponsors in the following classes:

(1) Licensed engineer, architect or contractor,

(2) Owners for whom he had done work as foreman, superintendent or contractor,

(3) Two building supply firms,

(4) A banking institution.

Since the new application form has been in use, 25 per cent of the applicants fail to produce evidence of their ability to prove qualification, either as to business reputation or a clean past record, and are denied licenses. The courts are upholding the law and several revocations, suspensions, and some jail terms for violations involving losses to building owners have shown that the law has "teeth." In its administration, Roy Butcher declares that the underlying philosophy by which the board is guiding its policy is that "the man who operates his business without making a true profit is denying to his competitors their constitutional right to make a living."

"LET'S SEE NOW—WHERE WAS I BEFORE LUNCH?"

Contracting On The Coast

[FROM PAGE 13]

is done by the larger contractors. But the studios maintain ample crews of electricians both for handling lighting equipment on the set and the installation of incidental electrical equipment.

Electricity is also extensively used in the poultry and dairy industries. Factory-like distribution centers combine groups of externally operated switches and motor starters connected by gutters, mounted either on wooden board panels or the concrete walls in the milk house or chicken house. Feeders are run from a common three-wire bus through the banks of incubators or to the brooder pits, and tapped off to individual fan ventilated, electrically heated brooders. Hen houses are equipped with lighting on time switch control. Feed choppers are common. Even soil heating cable is used to force green feed grown for the poultry throughout the year.

House Wiring Trends

Residential wiring is likewise as varied in the West as it can be anywhere else. All-metal ordinances were passed in a number of cities in southern and central California and as a result, in Los Angeles extreme speed has been developed by "bungalow specialists" in the installation first of rigid metal conduit, later electric metallic tubing, and lately of the flexible metallic conduit. Unbelievably low prices per outlet are quoted for the all-metal jobs. Elsewhere in southern California, too, a number of mass production attempts have been worked out by ingenious contractors who employed special crews.

One gang would go through a whole string of bungalows, in a new tract, drilling the holes and notching the joists. Another crew would follow with the pipe, a third would come along and pull in the wires, and a fourth crew would finish up after the plaster was on. Labor was paid on a piece-work basis and competition with this type of operator has caused many a headache among contractors doing individual jobs in the ordinary way.

But quoted prices for such "speed-burner" installations left the ingenious contractor very little profit as a reward for his skilled organization of the work. Many such operators, despite their high efficiency, went broke because they gave too much of the benefit of their planning to the customer and kept too little as a reward for the skill acquired through specialization in this field.

UMI

Better Lighting

DISPLAY NICHE LIGHTING

The display niche calls the customer's attention to a featured piece of merchandise—or it doesn't. In this instance it also serves to break the monotony of a long line of shoe boxes.

NICHES SELL — Special styles were featured in niches by one store and sales jumped.

Also, it is located directly above the shoe mirror, so anyone looking in the mirror to see the shoes they have on, is attracted to the shoes displayed in the illuminated niche. The merchant features in the niche, styles on which he makes a bigger profit, and that helps turnover.

In this niche, the background is a circular contour and painted a light cream to insure good reflection. They use 40-watt 18" Lumiline lamps, housed in half cylinders of Monax glass located at the top and bottom of the display.

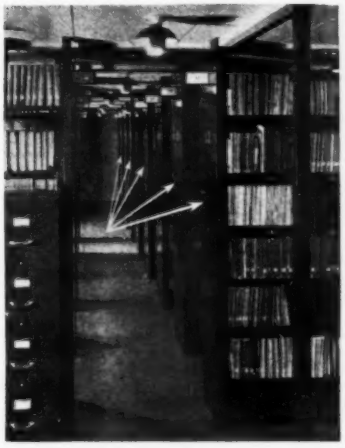
Cornwall & Gault, shoe store of Ashland, Ohio, featured special style shoes in special illuminated niches located above illuminated mirrors and report that the niche displays resulted in the sale of many extra pairs. This increase in sales paid for the lighting of both the mirrors and niches many times over.

A DOUBLE SILHOUETTE

This sign consists of double silhouette letters, mounted before a flat sheet of brushed metal. It presents the appeal of letters glowing in super-imposed colors against a rich background of subtle interlacing luminous pattern.

The letters are of the reverse metal, channel type, finished inside in white. The background is a sheet of stainless steel with vertical grinding or brushing. The letter heights are T-43 inches, O and C-26 inches. The rear channel contains two circuits of 15- and 25-watt colored lamps on three-inch centers. The front channel contains two circuits of 10-watt colored lamps on 1¾ inch centers.

DOUBLING BACK—Sign for interior display, combining two channels reflecting color.



LIGHTED BOOKWAYS—Research work requires an extensive reference library, so in the new Mellon Institute of Industrial Research at Pittsburgh there are bookstacks galore. Here is a typical cross aisle that leads to rows of shadowless shelves. Modern glare-reducing stack lights, using 60 to 100-watt lamps are wall-switch controlled, at convenient places marked by arrows. Wiring by Iron City Engineering Company of Pittsburgh.

SILHOUETTE TROUGH STRIPS

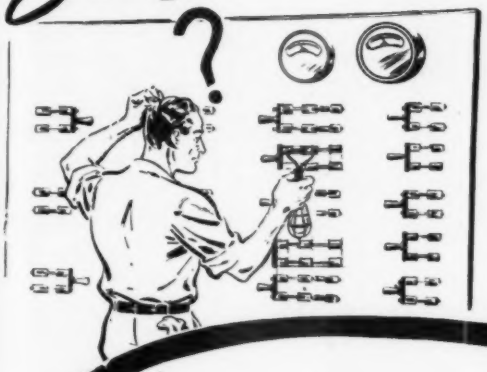
By placing lamps in a trough some distance from a mat surface background the troughs appear as a silhouette line. This dark band, then, becomes a part of the design.

The face of the trough may incorporate a decorated flashed opal glass panel, plain or decorated, which is

VERY BAD BEFORE—Under these 100-watt lamps, in ordinary reflectors, these knitting machines cast too many shadows. Errors and slow work resulted, because workers could not stick to their knitting with tired nerves. (Left)

AND NOW, LOOK—So they installed 385 feet of this Curtis "Light-Hood". Shadows vanished and spindles are all clearly visible to the worker, who must watch for flaws and broken threads and fix them. (Right)

Stop costly "HIDE AND SEEK!" use INDICATOR FUSES



Built-in "Sentry Light" spots the blow instantly!

Approved Underwriters Laboratories

FORGET test lamps . . . production delays! Built into every Indicator Renewable Fuse is an exclusive *Sentry Light* that glows the instant a short or overload occurs . . . shows at a glance "which fuse blew" . . . speeds re-fusing.

•

Indicator Renewable Cartridge Fuses are quickly removed and easily renewed. The shock-proof handle enclosing the *Sentry Light* is an ever-ready fuse puller. Minimum loose parts simplify reloading. Extra-heavy gauge fibre and brass resist more blows—insure longer life.

•

Indicator "6" Multiple Plug Fuse is the only fuse with six lives and the exclusive *Sentry Light*. Can be used six separate times without removal from socket. Should the fuse blow the *Sentry Light* glows and is easily detected. Turn handle one notch to right . . . *Sentry Light* goes out . . . new fuse comes in.

Write Department 302 for folder containing full details about complete line of Indicator Fuses.

INDICATOR CORPORATION

THE FUSE WITH THE "SENTRY LIGHT"

32-36 GREEN ST. NEWARK, N. J.

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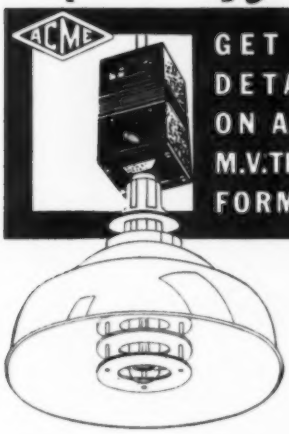
IF YOU'RE INTERESTED IN INDUSTRIAL *Lighting jobs*



There's money to be made by contractors who know the technical details of High Intensity Mercury Vapor lighting. Industrial plants everywhere, need and want this kind of lighting that provides twice the light at half the cost.
And the most important accessory is the transformer. That's why you should know why Acme high intensity M. V. transformers offer greater customer satisfaction and more money in your pocket.

FREE!

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36 Water St., Cuba, N. Y.
Send me immediately a copy of Acme High Intensity Mercury Vapor Transformer Bulletin.

Name .....

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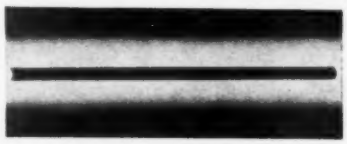
Acme ACME Electric
TRANSFORMERS

Better Lighting

[FROM PAGE 122]

made luminous by lamps placed behind the glass. The lamps in the trough should be placed no farther apart than one and a half times their distance from the background, to insure a smooth lighting effect.

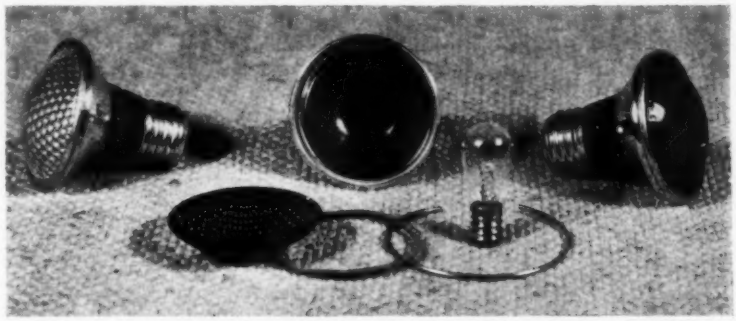


SILHOUETTE—Double decorative effect with trough light against mat background.

CLIMAX REFLECTORS

New units with small aluminum reflectors, using 3- and 6-watt clear lamps, have been made up with a medium screw base, so that they can be screwed into regular sign sockets. Natural colored glass roundels, available in seven standard colors as well as other special colors produce a sparkling color effect.

These units, sold by Climax Lamp, Inc. of Canton, Ohio, collect the light ordinarily wasted and redirect it down the street, thus increasing the brightness effect of signs. In addition, they insure better legibility at wider viewing angles. Being equipped with natural colored roundels, high color efficiency is obtained.



COLOR SPOTS—Units for 3- or 6-watt lamps for use in sign sockets with color roundels increase the lighting effect of signs.

TESTIMONY—This new lighting installation speaks for itself. It is the store of Charles Jacobs, Saugerties, N. Y., a room 50 ft. by 16 ft. with a 9 ft. 6 in. ceiling, painted flat white. It is lighted by five Wakefield Commodore Units, spaced 10 ft. apart, mainly 200-300-500 watt three-light lamps. Two units use a 150-200-350 watt combination. The illumination on the counter runs from 14 to 35 foot candles. Fiero and Farrell, contractors of Saugerties, made the installation.

NEW! A RADICAL FUSE DEVELOPMENT THAT CUTS INDUSTRIAL LOSSES

ROBOT FUSES

TRADE MARK

WATCHFUL SENTINELS OF ELECTRICAL LOSSES

PATENTED "FLOATING POWER."

FUSE PROTECTION

FROM HIGH AMPERE STARTING TO "MOTOR-NAME-PLATE" NORMAL RUNNING CURRENTS

OPERATES AUTOMATICALLY;

"SELF-COMPENSATING" AT ALL ELECTRIC LOADS.

THE ELECTRIC AUTOMATON

S.O.S.

IN COMBINATION WITH "FLOATING POWER." FUSE-ELEMENT AND SIGNAL-PILOT TO S.O.S:

1. MOTOR OVER-LOADS
2. MOTOR DANGER-LOADS
3. EXCESS CURRENT CONSUMPTION

AT LAST — motor users *need no longer run the risk of overfusing motors,* and *may now protect their equipment* against everyday abuses, with this startling NEW ROBOT FUSE development, long sought for by the electrical industry.

Motors, operating normally, consume about one-fourth the current needed to start them. Thus, when motors are over-fused four times to allow the momentary abnormal starting currents, they receive little or no protection as a consequence for the normal running, and are subjected to over-loads, and unchecked danger-loads *99% of the time.*

Science eliminates this hazard with a new development. The ROBOT "FLOATING-POWER" FUSE is self-compensating at all loads. It provides SAFE FUSE PROTECTION for the variable excess starting currents, and A-U-T-O-M-A-T-I-C-A-L-L-Y of its own action R-E-D-U-C-E-S I-T-S-E-L-F to the NORMAL SAFE MOTOR - NAME - PLATE running requirements. Hence the Safety Slogan: "STOP OVER-FUSING MOTORS— *for your motors' health sake.*"

In addition, ROBOT FUSES can be had with an "S O S" that AUTOMATICALLY signal-flashes over-loads, danger-loads, and excess current consumption of motors. Heeding the "S O S" will prevent burn-out of motors, reduce excess consumption of current, AND SAVE THE FUSES — all at the same time. Furthermore, reducing motor-dangers STOPS THE "S O S" AUTOMATICALLY — truly, a faithful automaton development.

Every industrial plant engineer, every maintenance man, and every user of electric motors will appreciate this scientific advancement in motor operation, safety, and economy. Motor troubles, overloads, repairs, interruption and impairment of production, and the "un-aware" losses can be reduced or entirely eliminated.

Application Made for Underwriters' Laboratories Approval

ELECTRICAL CONTRACTORS

ROBOTS offer you a new "opening wedge" for industrial business. Tell your industrial customers about this new fuse development. It will bring you additional wiring work and will serve as a lead to continued business. Write for folder and details showing how Robots can be used as a strong "wedge" for greater profits.

CHAMPION ELECTRIC FUSE CO.
684 BROADWAY, NEW YORK, N. Y.

INDUSTRIAL ELECTRICIANS

The "boss" will appreciate the savings in power and equipment that Robot installations bring. Let him know that you are up-to-the-minute on new developments in your field. Write today for folder giving complete details.

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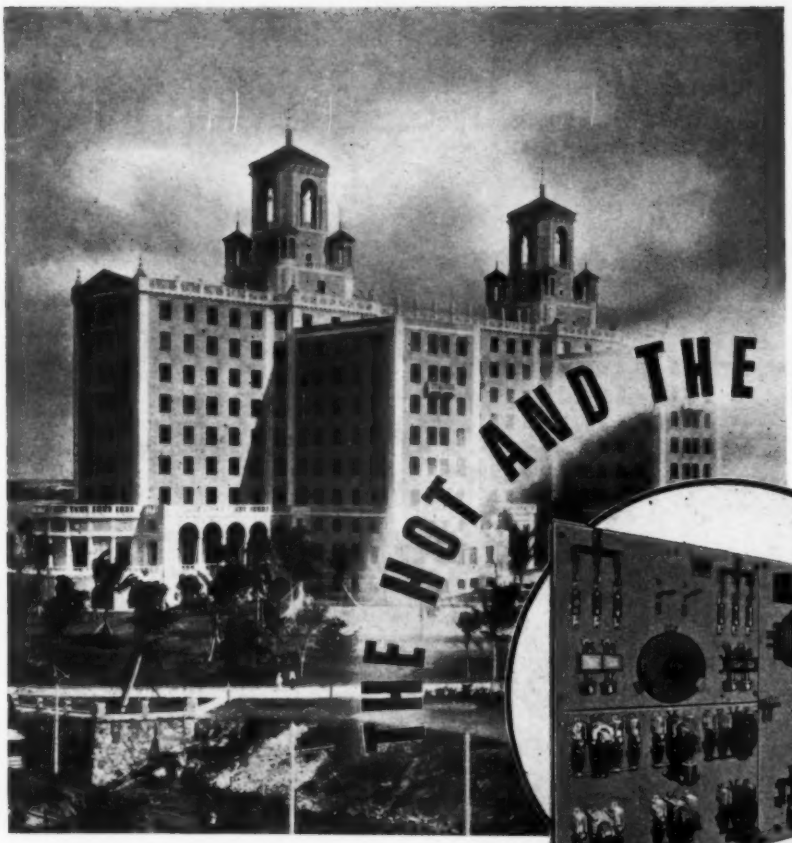
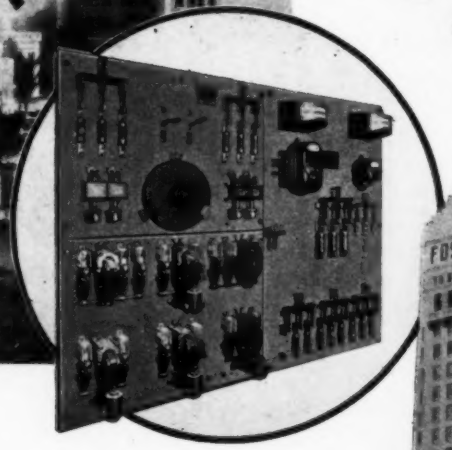


THE HOT AND THE COLD OF IT



Clark Duplex Pump Control, enabling either motor to be made the "leading" motor by simply throwing over the transfer switch

IN the National Hotel of Cuba in Havana and the Foshay Tower in Minneapolis, from the tropics to the snow country, especially where loads are heavy and conditions severe, there you find Clark Controls compiling records for steady operation and gratifying low maintenance. The panel illustrated is typical of Clark Controls in a wide range of types and sizes to meet every situation . . . What are your present requirements?

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We are ready to serve you out of twenty-one sales offices located in Baltimore, Birmingham, Boston, Buffalo, Chattanooga, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Los Angeles, Minneapolis, New Orleans, New York, Philadelphia, Pittsburgh, St. Louis, San Francisco, Seattle, Toronto. Emergency calls will receive prompt attention.

THE CLARK CONTROLLER COMPANY

1146 EAST 152nd STREET CLEVELAND, OHIO

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ELECTRICAL

Maintenance

INDUSTRIAL AND COMMERCIAL

25 Foot Candles— No Shadows, No Glare

BEFORE THE CHANGE—A section of the Crosley production line—glass-steel diffusers with 200-watt lamps.

WITH NEW LIGHTING—Same location in Crosley's, with illumination from indirect domes, bowl silvered lamps of 150 or 200 watts.

By JOHN MICHELSON

Electrical Engineer, Maintenance Department Crosley Radio Corporation, Cincinnati, O.

ON strictly a dollar basis, it has been proven time and again that good illumination will more than hold its own as a dividend paying investment with other types of modern production equipment. An outstanding example of this is the lighting equipment in the plant of the Crosley Radio Corporation, Cincinnati, Ohio. Here, a system was devised which brings almost the equivalent of daylight illumination into the factory, with a current consumption of only 3.6 watts per sq.ft. of production area. It is estimated that the entire cost of the installation will be paid for in five years by the saving it will effect over the old method, which at the time of the change was as modern as the illumination in most plants today.

Feeling that the existing illumination did not bring the desired results, the Crosley engineers made exhaustive tests of various kinds of lighting equipment and arrangements. Elaborate charts were devised to determine the exact lighting requirements.

Objectives

The four major objectives in the Crosley program were—

1. To obtain even illumination of approximately 25 foot-candles over the complete floor area.

UMI

2. To soften shadows to the greatest possible degree.

3. To minimize glare.

4. To use present wiring to the greatest possible extent.

Actual results exceeded expectations. It was found that a current consumption of only 3.6 watts per sq.ft. of production area was producing even greater illuminating efficiency than was formerly achieved with approximately 4.5 watts in many departments.

Prior to this new installation, the Crosley Radio Corporation was using about 2,500 glassteel diffusers with 200 watt clear lamps, which were moved whenever a production line was changed. There was the natural desire to eliminate this constant changing of lighting equipment.

The Solution

After much experimentation, it was found that fixtures 9 ft. from the floor provided the necessary illumination over the entire working plane. This, however, would have required more outlets than were available in the plant at the time. It was therefore decided to equip one building completely with the existing type of glassteel diffusers, and purchase new lighting equipment for another building. After thorough tests with all kinds of equipment, an "Indirect Dome" type of fixture using a silvered lamp, was chosen as giving best results with the low ceiling height of 11 ft. This fixture provides well-diffused illumination over a wide area and at the same time utilizes light rays which are otherwise lost in the neck of the reflector to illuminate the ceiling.

Proper ceiling illumination increased the general illumination, so that shadows were reduced to absolute minimum. Once completed, it was found that 150 watt lamps could be used in most locations, and 200 watt lamps wherever fine inspection was necessary. Thus, the average illumination obtained exceeded 25 foot-candles.

And Results

The difference between the old lighting system and the new is shown in the photographs on previous page. Note the absence of direct glare as well as the manner in which shadows have been almost eliminated.

Figuring the cost of the installation from the standpoint of decreased current consumption, less the amount expended each year for moving the old lighting fixtures, it was found that the investment would pay for itself in five years. And this estimate does not take into consideration the improved working conditions and the increased production made possible through better illumination in the plant.

"LIGHT HOUSEKEEPING"

The preceding article showed how a maintenance department revamped the illumination for specific conditions. Here are some general pointers on maintaining the proper "See Level" . . .

One of the most important factors in plant operation is to provide the proper "see-level." Unless employees can see what they are doing they cannot be expected to turn out good work. The accident hazard, as well as employee eyestrain and fatigue, caused by poor lighting must also be considered.

Illumination in a plant is good, and will remain good, if it measures up to the following requirements.

1. Overhead lighting system is of at least the minimum foot-candle value specified in the American Standards Code of lighting (abridged version, p. 130).

2. Supplementary local illumination gives the necessary light for fine work.

3. Glare has been eliminated.

4. Quality of light permits color discrimination where necessary.

5. Walls and ceilings are light enough in color to prevent undue light absorption.

6. Wiring is adequate for lighting load, making available correct voltages at lamps.

7. Periodic cleaning schedules are maintained for lamps, reflectors, ceilings and walls.

8. Burned out and blackened lamps are replaced immediately.

One of the important things for the plant electrical man to remember is that merely increasing foot-candle values will not necessarily bring about ideal lighting conditions. Glare, uniformity of light, and the contrast between objects and their backgrounds are all extremely important. However, there is generally room for greatly increased illumination levels after lighting tests are made in various departments.

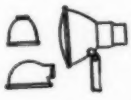
The American Standards tables pre-

WHERE DETAILS ARE IMPORTANT

At the Bibb Manufacturing Company, Bibb City, Ga., they stopped complaints on lighting, ended eye strain and saved a lot of spoilage by combining incandescent and Cooper Hewitt lamps in the weave room. Here colored fabrics and other fancy weaves are produced and the former 200-watt incandescent lamps were not satisfactory. An increased level of detail-revealing light was obtained without scrapping the original installation by mounting 50-in. Cooper Hewitt lamps on 16-ft. centers down the weave alleys to supplement the incandescents.

ELECTRICAL MAINTENANCE GUIDE SHEET

A "DICTIONARY" OF REFLECTORS

TYPE		CLASSIFICATION	APPLICATION
	Porcelain Enameled Steel or Aluminum Dome	Direct Distributing, Downward	Most widely used for general illumination in industrial interiors.
	Metal Reflector With Globe	Direct Distributing, Downward	Provides well diffused light for high quality work. Can be equipped with a blue glass globe for improved color quality.
	Deep Bowl	Direct Semi-Concentrating, Downward	Light is directed strongly downward for industrial use where units must be mounted high.
	Intensifiers	Concentrating, Directional	Used where high intensity of illumination is required on a small area, such as sewing machines, fine inspection, printing press.
	Glass Enclosing	Semi-Direct Distributing, Major Portion of Light Downward	Used extensively for commercial lighting because of its high efficiency and ease of maintenance.
	Globe	Semi-Indirect Distributing, Major Portion of Light Upward	Used in preference to semi-direct units where greater diffusion is desired.
	Inverted Bowl or Reflector	Indirect Distributing, Upward	For highest diffusion of light. Units include open semi-indirect as well as totally indirect.
	Cove	Indirect Distributing, Upward	Method of mounting lamps and equipment, usually in the form of a continuous line, to obtain indirect lighting.

Note: These reflectors are typical of those in general use. Some types are furnished with chromium plate, prismatic glass, processed aluminum, or plastic material, with various types of canopies and holders. Similar reflectors are used with high intensity mercury vapor lamps or in combination with incandescent lamps.

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RECOMMENDED STANDARDS OF ILLUMINATION

Foot-Candles	
100 or more	—Very severe and prolonged tasks. Discrimination of fine details of low contrast such as sewing on dark goods, fine engraving, fine assembly work, lace making, weaving, and inspection work.
50 to 100	—Severe and prolonged tasks. Proof-reading, drafting, average needlework, watch-making, and fine machine work.
20 to 50	—Moderately critical and prolonged tasks, clerical work, average reading, average sewing on light goods, common benchwork.
10 to 20	—Moderate visual tasks. Occasional office and factory work, ordinary reading when not prolonged, medium bench and assembly work.
5 to 10	—Moderate tasks where only slight visual discrimination is necessary. Rough machine, assembly, and bench-work.
2 to 5	—When discrimination of details is unessential. Handling coarse materials, corridors, stairways, auditoriums.

viously referred to are recognized as quite conservative, even though the minimum-maximum values for various applications have been increased consistently, as the tables have been revised from time to time during the past two decades. In many plants the illumination values are much higher than those given in the tables.

Surveys Helpful

Where a plant has recently come out of a business slump or where relatively rapid expansion has caused new equipment to be installed or machines to be rearranged, it will usually be worth while to make a complete illumination survey. Local power companies are, of course, ready to help in such an undertaking. Practically every utility has a lighting or industrial sales bureau, which is in a position to analyze lighting conditions in a customer's plant. The various lamp manufacturers can also furnish wiring specifications, comparative data on lighting fixtures, and forms for recording test results.

Simple foot-candle meters are available today which permit rapid checking of lighting intensities. By means of them, a relatively rapid survey can be made of various departments in the plant, to see whether at least minimum accepted standards are being adhered to. Machinery and assembly setups can be plotted in such drawings, as well as locations of the lighting fixture outlets.

If much overtime work is done in the plant, readings should be taken after dark. In any event, any record of such a survey should include the time of day the readings were taken.

Interior surfaces should next be looked after. Readings of reflected light taken with the above-mentioned instruments, at an angle of about 50 to 55 deg. from the normal, will give some idea of the amount of light lost in walls.

Reflective values of paint vary from 40 to 80 per cent. Therefore, where painting is going to be done anyway for cleanliness, protection, and appearance, the lighting aspect of the job should not be overlooked. A point to be remembered is that glossiness does not mean that the paint necessarily has a high over-all coefficient of reflection. As regards seeing conditions, *diffused reflecting walls* (rough surfaces of light color) are always best. Another thing to remember is that often soap and water alone can be made to pay big lighting dividends.

If existing levels, as determined by such a survey, show that intensities in many places should be increased, the desired results can be obtained in several ways—

1. By increasing wattages—which brings up questions of adequate wiring.
2. By relocating fixtures.
3. By rearranging equipment.
4. By choice of fixtures better suited to the job.
5. By supplementing general overhead illumination with local lighting.
6. By increasing the reflective values of walls and ceilings.
7. Or by combinations of these.

One quick check as to adequacy of wiring for illumination needs, is to determine actual voltages at lamp sockets at various points in the plant, under conditions of heavy electrical load. And although lamps burned at lower than their rated voltages last longer, they are expensive because the amount of light they produce per watt input is greatly reduced.

Glare should always be taken into consideration also. It is the condition existing when a person must view objects against bright backgrounds or penetrating light sources. A simple rule is that glare is *always* unnecessary —the right kind of reflector or relocation of the fixture will eliminate it.

In addition to sufficient light intensities and glare, the quality of light is important. Where color discrimination is required, "daylight" units are available. Where fine detail work is to be done, mercury or sodium lights provide what lighting specialists term "visual acuity"—the nature of the light being such that fine details stand out sharply.

In any lighting maintenance program, definite periodic cleaning schedules should be decided upon. The frequency of such cleaning will, of course, depend upon the type of operations being per-

MIKE'S MAINTENANCE MANUAL

By J. M. Zimmerman
Service Division
Westinghouse Electric & Manufacturing Company, Chicago, Ill.

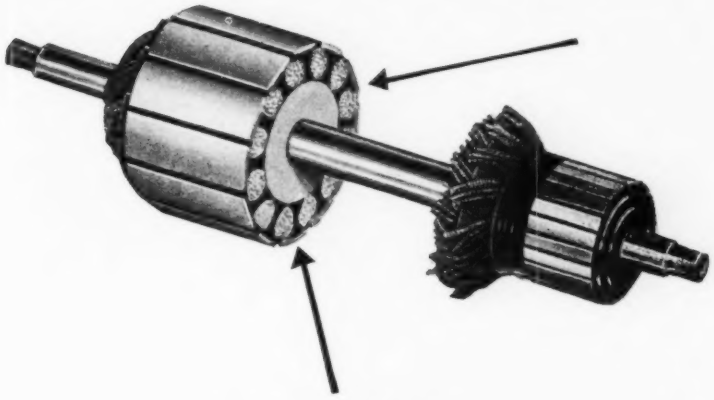
"Well-Taped Ends— No Needless Mends"

MANY motor manufacturers and even reputable repair shops will not tape the end windings of a partially closed slot stator back into the slot. They depend upon the slot cell and conductor insulation to protect against voltage breakdowns to the core.

This unprotected winding catches the elements and many times causes a premature failure. If the winding cell becomes broken, the last safety factor is gone. Therefore, use well-taped ends of the conductor back into the cores of partially closed slot stators, at least a half inch.

Get complete penetration..

OF A DEEP WINDING



WITH

HARVEL 612C

INSULATING VARNISH

ELEVEN OUTSTANDING FEATURES

Produces firm, tough mechanically **strong coating.**

•

Penetrates throughout.

•

Bonds conductors into a **compact** unit acting mass.

•

Is **stable,** insuring **constancy** of electrical properties.

•

Is **non-corrosive.**

•

Is **oil-proof** to a high degree.

•

Has exceptional **acid and alkali resistance.**

•

Has high **dielectric strength.**

•

Has **no objectional solvents** that attack enameled wire.

•

Cures to an **infusible** state. Will **not soften or throw.**

•

Will **not liver or solidify** during storage.

● Instead of depositing a heavy coating on the surface of the coil or winding and nothing but a solvent stain within, Harvel 612C **penetrates throughout.** It is essentially a processed liquid with no gums or asphaltic materials added.

Write for technical bulletin. Which completely outlines the numerous features of HARVEL-612C.

STANDARD OF THE WORLD
IRVINGTON INSULATION
TRADE MARK

Manufactured under HARVEL PATENT LICENSES *by*

IRVINGTON VARNISH & INSULATOR CO.

IRVINGTON, NEW JERSEY, U.S.A. *Est.* 1905

VARNISHED CAMBRIC • VARNISHED CAMBRIC TAPES • IRV-O-SLOT • VARNISHED CANVAS
VARNISHED SILK • FLEXIBLE VARNISHED TUBING • VARNISHES AND COMPOUNDS

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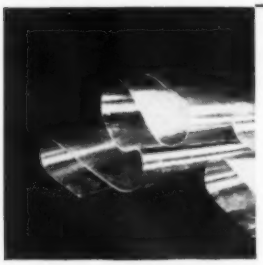
They Fit All Motors

BUNTING Standardized Electric Motor Bearings are available for motors of all makes and models from 1/40 hp. to 60 hp.

They are completely machined and finished—ready for immediate assembly. They always fit because they are made exactly to the dimensional requirements of the motors they service. Buy them as you need them in small or large lots, attractive low prices. . . . The Bunting Brass & Bronze Company, Toledo, Ohio. Branches and Warehouses in All Principal Cities.

Write for catalog giving complete listing of Bunting Standardized Bearings for electric motors and all mechanical applications.

BUNTING Quality
BRONZE BUSHINGS • BEARINGS
MACHINED AND CENTERED BRONZE BARS
BABBITT METALS



MICABOND

adaptable MICA insulation

Micabond will help you speed up repair work on armatures, commutators, and all electrical equipment requiring a high quality uniform mica insulation.

TUBING • TAPES • PLATE • RINGS • FLEXIBLE SHEETS • SEGMENTS • SPECIAL SHAPES

Large stocks of Micabond in its many forms and grades are on hand at all times at our plant. Your orders will be shipped promptly. Emergency orders get special attention.

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CONTINENTAL-DIAMOND FIBRE CO. • Newark, Del.

formed. It will have to be determined by experiment.

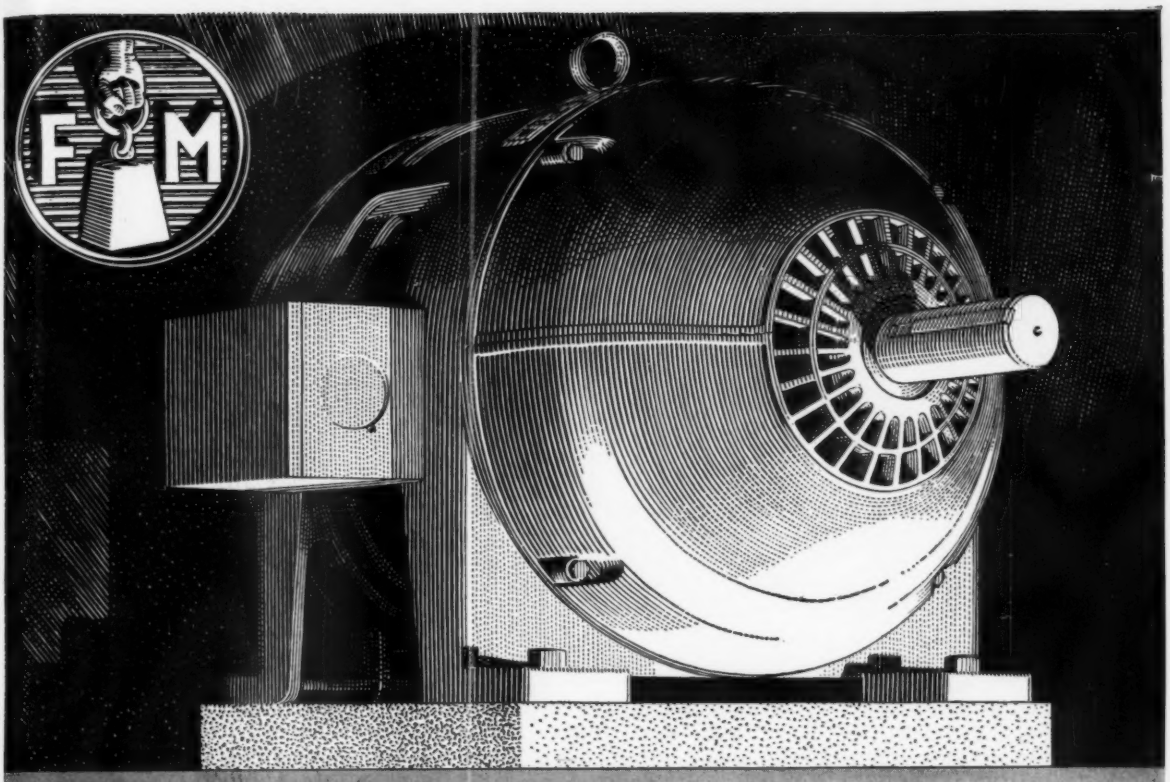
This involves taking periodic foot candle readings in the various departments, after a lighting system designed for adequate intensities has been installed. It is surprising how rapidly dust on the lamps deteriorates a good lighting installation. And worst of all, this deterioration comes about gradually, so that often as much as 25 per cent of the light which should be delivered is lost, without operators realizing it.

Lamp replacement schedules are as important as cleaning schedules. Many plant men set a maximum number of hours of use upon their lamps, depending upon types used, manufacturers' recommendations, and of course, the degree of cleanliness of the environment. When this predetermined life span has been covered, the lamps are replaced *whether or not they have burned out.* This means increased cost, as far as actual lamps are concerned, but the real lighting cost is actually decreased because of the rapid loss in efficiency experienced as lamps approach their burning-out point.

CLEAN BEARINGS — Washing machine used to remove grease and dirt from anti-friction bearings.

"Wash Day" for Ball Bearings

A motor-operated washing machine, in which anti-friction type bearings are thoroughly washed and scrubbed, has proved a great aid in servicing motors at the Westinghouse Chicago Service Shop. Two baskets, approximately 10 in. x 15 in. in size and 5 in. high are suspended from a rocker arm that dips the baskets in and out of the cleaning fluid 44 times a minute. All bearings are washed for at least ½ hr. When a bearing comes out of this machine every particle of hard grease and dirt has been removed. It is then coated with fresh lubricant and wrapped in oil-proof paper for storage until re-assembled in the motor.



THIS IS NOT AN ORDINARY MOTOR

● Completely protected, completely isolated within its specially designed enclosure, this motor operates where standard open-type motors soon would fail. In the presence of abrasive dust and corrosive fumes that would shorten motor life to a matter of weeks, this Fairbanks-Morse fan-cooled motor will run indefinitely.

This is more than an ordinary motor with a special housing. It is built especially to meet severe service conditions. It is designed with a unique ventilating system to prevent excessive heating. Ball bearings, characteristic of all Fairbanks-Morse motors, require only once-a-year lubrication.

If your service requires motors that are built to "take it," find out about F-M fan-cooled motors. Write for Bulletin M-42. Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill. 34 branches at your service throughout the United States.

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DIESEL ENGINES • ELECTRIC MACHINERY
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EQUIPMENT • FARM EQUIPMENT • HOME
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ING AND AIR CONDITIONING EQUIPMENT

Motors

UMI

PROFIT *with* Wagner Motors

Small Motors

Electrical dealers and contractors can profit by handling a well-known, dependable and complete line of both fractional- and integral-horsepower motors.

Wagner motors are well-known to both industry and the home. Millions of homes have Wagner-motored refrigerators, oil burners, coal stokers and other appliances giving satisfactory service to their owners. Wagner motors have long been faithfully driving thousands of different applications in industry. The name "Wagner" has therefore developed wide customer acceptance. This means a lot to you—it means that it will require less sales effort on your part to sell and recommend Wagner motors.

In addition, whenever you recommend Wagner motors to your customers, you can give them an absolute assurance that they are guaranteed and will give satisfactory service and trouble-free operation.

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MM237-1A.

Large Motors

Wagner Electric Corporation

6400 Plymouth Ave., St. Louis, Mo.

MOTORS · FANS · TRANSFORMERS · BRAKES

Cost per Foot, Butt, Lap, and Fillet Welds in 10, 12 and 14-Gage Metal

Type of Weld	10-Ga.	12-Ga.	14-Ga.
Cost per foot plain butt welds.....	$0.0317	$0.0272	$0.0176
Cost per foot lap welds.....	0.0294	0.0260	0.0284
Cost per foot corner welds.....	0.0208	0.0199	0.0183

NOTE: The above are only actual welding costs of making welds one foot long of the type mentioned. No allowance is made for fatigue, cleaning of welds, setting up the work, interruptions, etc., because these vary greatly.

***ELECTRIC WELDING COSTS**—For three types of welds, three thicknesses of steel.*

Electric Welding Is Cheaper

Electric welding and its advantages for maintenance men and electrical contractors were described by C. M. Taylor, vice-president, The Lincoln Electric Co., in the September issue of Electrical Contracting.

In this article the same author discusses the costs of welding various joints in three thicknesses of steel.

The inherent economy of electric welding over other processes of joining metals, particularly mechanical processes such as riveting or bolting, is due to simplicity. This simplicity is attained because arc welding joins two members directly to each other without the use of a third or connecting member; whereas to join two members by riveting usually requires an additional member. This advantage is responsible for savings in designing and detailing. Electric welding calls for less material. This saving in material, due to elimination of intermediate connecting members, is between 15 and 25 per cent, and in some instances considerably higher.

Welding Brackets

Welding brackets to steel work furnishes an excellent example of the above-mentioned economies. For use of welding for this work, in place of riveting or bolting, is becoming universal since drilling of holes in steel buildings is not permitted as it used to be. There is an immediate saving in the cost of preparing the brackets. With riveting or bolting, it is necessary to prepare a detail drawing of the steel in the bracket and in the connecting member. On the other hand, the only preparation necessary with arc welding is the cutting of the bracket to the size required. Thus, savings not only in material but also in time and labor of preparation are effected. In addition, welding brackets saves time in the actual attachment of the brackets.

The accompanying table shows costs per foot of welding butt, lap, and corner joints in 10-gage, 12-gage and 14-gage steel. The figures indicate a cost of $0.0176 cents for making a butt weld one foot long in 14-gage material. For fractions or multiples of one foot, the costs would be approximately proportionate. The figures are based on the following factors: electrodes at 10 cents per lb.; power at 2 cents per kw.-hr.; labor at $1.00 per hr.; operating factor 50 per cent; efficiency 50 per cent; all welds in flat position.

The economies of electric welding increase in direct proportion to the extent to which the process is used. Comparing the cost of joining one bracket to steel work by riveting and by electric welding will show an advantage for the latter method. However, if instead of one bracket, the comparison is made on the basis of 100 brackets, the savings will naturally be much greater. The savings available can be safely estimated as 15 to 25 per cent.

This discussion of costs is, of course, based on proper procedures, and the use of efficient arc welding generators and electrodes designed for the work being done.

Heavy Grinder Increases Production

Switchboards and cubicles for all types of control equipment are manufactured by the Powerlite Switchboard Co., Cleveland, Ohio. In line with present-day standards, these are constructed by forming and welding of heavy steel sheets with angle-iron frame-work on certain types. In finishing, all welds are ground smooth and carefully sanded.

Because ordinary hand grinding tools were inadequate for this heavy continu-

PORTABLE TOOL *— Heavy duty grinder and sander speeds up production about 20 per cent.*

ous work, a large, specially-made, heavy-duty grinder was put on the job. It is rated at 110 volts, 9 amp. and uses heavy 6-in. grinding wheel. Production has been increased about 20 per cent. The operator does not have to "baby" his tool, for the grinder takes the hardest use continuously.

A portable heavy duty sander (shown at the left of the operator) is used to finish off rough surfaces after grinding. The sander is rated at ½ hp., 3,425 r.p.m., 110 volts, single-phase, 60 cycles.

For Ups and Downs in Voltage

At the Hotel Hollenden, in Cleveland, maintenance cost on a partial installation of squirrel cage motors was found to be low. As a result, a complete changeover of various house pumps and other motor applications from d.c. motors to squirrel cage a.c. motors was made. But in changing over one 30-hp. squirrel cage motor, difficulty was encountered, in that the large starting current required produced undesirable line voltage fluctuations.

This trouble was easily remedied by the installation of a carbon-pile resistance-type starter manufactured by the Allen-Bradley Company. By compressing the carbon piles, the resistance in each leg is gradually decreased, thereby increasing the current and thus starting the motor. As the motor comes up to full speed, a set of contactors close to

KRAEUTER

Standard in Plier Quality SINCE 1860

There is a pair of KRAEUTER PLIERS for every purpose—over 200 styles and sizes.

During the past 75 years America's ablest mechanics have shown a marked preference for Kraeuter Pliers.

WHY HAVE THEY?

Because Kraeuter Pliers are more dependable and make the job easier through their superior quality and greater gripping and cutting power.

Here's why they are superior!

KRAEUTER PLIERS are drop-forged from special high-grade steel.

KRAEUTER PLIERS are scientifically heat treated in automatic furnaces where the possibilities of human error are entirely eliminated.

KRAEUTER PLIERS must EACH pass rigid cutting and gripping tests at the factory; far greater than when in actual use.

Every tool banded "KRAEUTER" is GUARANTEED PERFECT in both materials and workmanship.

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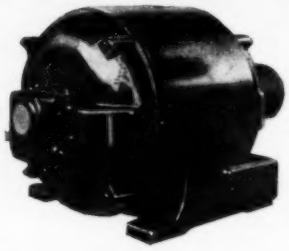
(Pronounced KROY-TER)

NEWARK, N. J.

Manufacturers of Highest Quality Pliers and Tools Since 1860

Peerless MOTORS



Made Tough for Rough Service

THERE is one quick way you can prove the outstanding quality of Peerless motors. On your next job that calls for a husky-built motor, use a Peerless. Peerless motors can "take it." They're made tough to withstand rough service. Peerless construction includes:

Super-insulated windings; Oversize bearings; Indestructible rotors for polyphase motors; Rugged, dependable short circuiting device for single phase motors.

With a Peerless motor on your job, you can guarantee the installation. Range of sizes ¼ to 10 horsepower.

THE PEERLESS ELECTRIC CO.
WARREN, OHIO

Money Makers

Money Savers

SORGEL AIR-COOLED Transformers

Make money by showing your customers how SORGEL Air-Cooled Transformers reduce the cost of lighting and portable tool operations, by connecting them to power circuits. SORGEL Air-Cooled Transformers cost less to install, no fire-proof vaults or enclosures required. No oil; no upkeep.

Approved by Underwriters.

Stock sizes ¼ to 50 KV-a.
Larger sizes to order.

Write for literature with diagrams and prices.

SORGEL ELECTRIC CO.
No. Plankinton Avenue Milwaukee, Wis.

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A complete directory of electrical and allied products

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ELECTRICAL CONTRACTING
330 W. 42nd St., New York

short out all the resistance, so that the motor is then connected directly to the line. This procedure starts the motor smoothly and with no heavy current inrushes, thereby eliminating the undesirable line voltage fluctuations previously encountered.

Keeping Annunciator Systems Working —27 Maintenance Pointers

Annunciator systems as a rule are used by busy executives, who find it necessary to summon their employees for consultation or service. Many of these systems are in use constantly, and should receive careful maintenance, as a break-down means loss of time and money.

The following suggestions are offered to keep these systems in satisfactory operating condition:

A—When bell or buzzer fails to operate.

1. Adjust bell or buzzer.
2. Check for loose connections at audible signals.
3. Check for open circuits in common drop wire leading to the audible signal, or in electromagnet.
4. Check for weak battery.

B—When drops, lamps and audible signals in general do not operate.

5. Check for weak battery, defective transformer, defective battery eliminator, or blown fuse.
6. Test for open, short-circuited or grounded feed wires from source of current supply.
7. Examine feeder terminals in annunciator.

C—When trouble is limited to certain drops.

8. Check for weak battery.
9. Examine drops for sticking armatures, also for dirt and lint at drop pivots.
10. Check for open circuits in the drop magnets.
11. Check for defective soldered joints or defective terminals leading to drops.
12. Examine contacts of push buttons on circuits controlling drops.
13. Test for open-circuit, short-circuit or grounded section wires leading to the drops.

D—When trouble is limited to some drops.

14. Examine lamps and replace if defective. If series circuit, check all lamps in group.
15. Check for weak battery.
16. Check relays controlling the lamp circuits.

DESIGNED FOR ECONOMY

THE C & E *SUPER-DUTY* HAND PORTABLE

No. 7H04-T

(PATENT PENDING)

MADE to give longer service—be dependable during daily duty or emergencies—make the usual replacements and repairs unnecessary—save time, work and money . . . this most modern of portables certainly is the cheapest in the long run.

All strain is removed from connection and conductors in the socket, preventing dangerous shorts. Live rubber sealing at base and around cord give further protection. A half inch thick shell of heat cured rubber, finished with a special acid and oil resistant lacquer, forms the new shockproof handle.

Wasteful breakage is cut down by the cadmium plated guard and swivel hook which permits hanging the lamp out of the way. A full length half reflector is usually used to shade the workman's eyes . . . but it also saves costly accidents by acting as a shield when bulbs are broken unavoidably. Yes . . . you can be sure that this portable will pay for itself *soon!*

PRODUCTS

All Rubber Attach. Plugs & Sockets. Rubber Handles for Exten. Cords. Metal, Fibre & Rubber Insulated Lamp Guards, Vaporproof Portables, Test Leads, String Lights, etc.

WRITE FOR CATALOG

The

ERICSON MFG. CO.

First to make rubber portable handle, plugs, etc.

5720 Euclid Ave., Cleveland, Ohio

Warehouse Stocks at: Boston, Mass., Chicago, Ill., New York, N. Y., San Francisco, Cal., Seattle, Wash.

17. Check lamp receptacles for proper seating of lamps, or possible break-down or cutting through of insulation of base contact.
18. Check for defective soldered joints or at terminals leading to lamp receptacles.
19. Examine contacts of push buttons on circuits controlling drops.
20. Test for open-circuit, short circuit or grounded section wires leading to lamps.

E—When more than required number of drops or lamps operate at same time.

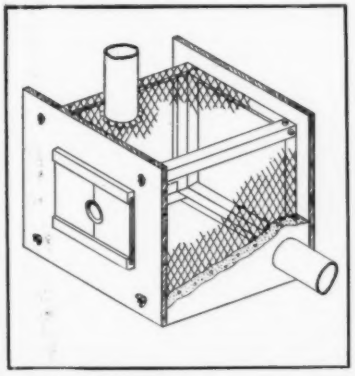
21. Examine multiple push buttons for broken or badly adjusted contact springs.
22. Test for crossed, grounded or short-circuited section wires.
23. Examine terminals and distribution blocks for wires that may have become loose and have contacted with other terminals.
24. Examine multiple contact relays in lamp annunciators, having interlocking circuits, making certain that proper contact springs are open or closed as required.

F—When lamp signal is dim.

25. Check lamps, as they may be old and ready to burn out.
26. Check for weak battery, defective transformer, or defective battery eliminator.
27. Test for grounded or crossed section wires.

Controlling Motor Fires

Many industries operate motors in locations, where they could cause serious fire damage, if a winding should burn out while no attendant was at hand to fight the blaze. Recognizing this hazard the engineering service depart-



MOTOR HOUSING—Details of fire-resistive construction for preventing motor burnouts from causing a general fire.

Prest-O-Lite Trade-Mark **TORCHES AND SOLDERING IRONS... *ideal for electrical work***

● ***Prest-O-Lite*** **Torches and Soldering Irons are available in convenient and moderately priced outfits, covering every open-flame or enclosed-flame requirement of the electrical contractor. These appliances are economical equipment for soldering, heating and brazing.**

Prest-O-Lite **appliances operate on** ***Prest-O-Lite*** **Gas, which can be obtained conveniently in small tanks at any of the thousands of** ***Prest-O-Lite*** **Gas Exchange Service Stations. You exchange your empty tank for a full one and pay for the gas only.**

Your jobber will gladly demonstrate the many features of ***Prest-O-Lite*** **equipment. Call him, or write the Linde office near you.**

THE LINDE AIR PRODUCTS COMPANY

Unit of Union Carbide and Carbon Corporation

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New York and Principal Cities

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CUTS COSTS! ASK OUR USERS

(LOW PRICED)

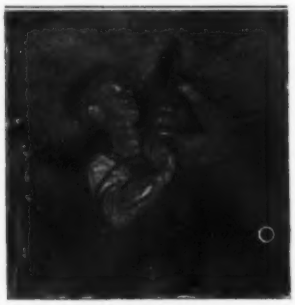
THE MILWAUKEE HAMMER-DRILL

Combination Electric Hammer and Drill

The Milwaukee Hammer-Drill (Combination Electric Hammer and Drill). Hammer attachment can be easily removed if user desires to drill holes through wood or steel. *Full Ball Bearing Construction throughout.* It stands the "Gaff."

Furnished complete with sturdy wooden carrying case, ⅜" Jacobs chuck and key, special taper tool chuck, one ½" star drill, and 12 ft. 3-wire heavy duty rubber cable.

Universal motor for DC or AC 25, 40 or 60 cycles. Furnished with 32, 110, 150 220, or 50 volt motor.



IT HAMMERS!

Up to 1⅛" diameter holes in concrete when using a hollow-drill. Will drill ½" hole 4" deep in one minute. Use it for scaling, channeling, grooving, vibrating, bush-hammering, caulking, etc.

IT DRILLS!

Up to 5/16" diameter holes in steel, 1⅛" in wood. Every shaft mounted on precision, oil-seal, dirt-proof ball bearings. Helical cut, alloy steel gears. ⅜" heavy duty Jacobs key chuck.

IT GRINDS!

Sharpen your tools right on the job by using emery wheel with arbor to fit into chuck of electric drill.

Easy, quick and convenient.

MILWAUKEE ELECTRIC TOOL CORPORATION

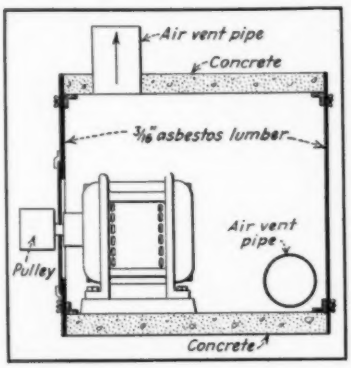
106-109 N. Water St.

MILWAUKEE, WISCONSIN

ment of the Michigan Millers' Mutual Fire Insurance Company of Lansing, Mich., provides its clients with a set of detail sketches that show how a standard fire resistive motor inclosure may be built.

A frame of 1-in. L-iron is covered on top, bottom, and two sides with metal lath. Vent inlet and outlet pipes are then installed. The motor bearing ends of the inclosure are then fitted with 3/16-in. asbestos lumber fastened to the steel frame with wing nuts.

With these end panels in place, a temporary wood form is made for the sides of the housing to permit a 1½ to 2 in. thick concrete wall to be cast around the metal lath reinforcing. One of the asbestos panels must have sectional sliding panels to fit around the motor shaft. These inclosures should be made large enough to allow a liberal amount of space for the existing motor and for the possibility of an increase in motor rating.



CROSS SECTION—Motor is free to be moved on its base, and remains accessible for regular inspection and maintenance.

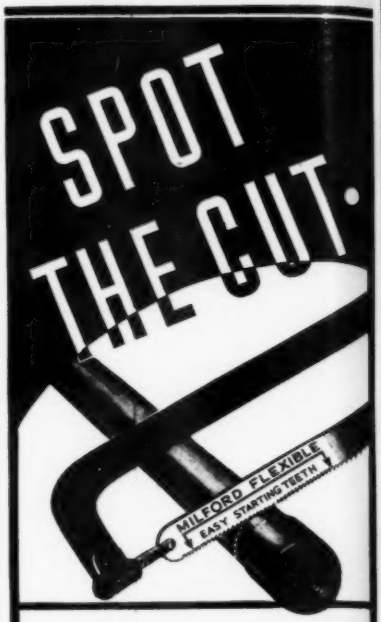
Four Problems Solved—

Power bills cut: Capacitors installed in a pottery plant saved $130 per month in reduced power bill. The equipment cost $750.

Night work: Floodlights enabled construction work on a sewage disposal plant to be carried on after dark. Work was kept up to schedule.

Production Increased: New drives with higher speeds increased efficiency of machines by 25 per cent at a hosiery mill. Valuable space was saved in the mill layout.

About the weather: Weatherproof motors and controls were installed at a tobacco by-products factory, for protection from the elements. The factory has no roof.



MILFORD FLEXIBLE

The Blade with the **EASY-STARTING TEETH**

With this blade you can start cutting with the first full sweep of the blade.

Will not slip off the cutting line.

The teeth will not catch in corners.

Start a cut at any angle.

●

MILFORD FLEXIBLE

The ideal blade for the electrician. It will not break off or fly to pieces in a frame—it is safe. Teeth are file hard and this blade can be used to cut anything used on the job.

Ask your jobber for

MILFORD FLEXIBLE

The Blade with the **EASY-STARTING TEETH**

THE HENRY G. THOMPSON & SON CO.

NEW HAVEN, CONN.

Saw Makers for over Half a Century

HAZARD PRODUCTS

FOR THE *Electrical Contracting Industry*

PERFORMITE INSULATION

Performite is a higher type of rubber insulation which affords longer life and greater safety. Performite rubber insulation is tougher and stronger than any in common use heretofore, and has greater life. It is made with "Safecote" weatherproof and flame-retarding finish.

HAZARD SERVICE ENTRANCE CABLES, Type SE

The small sized pipe-enclosed wires of many old type house services definitely limit the customer's load.

These modern cables with bare neutral conductor especially fit in with the new sequence arrangement of meter, switch and fuse. Their low cost, ease of installation, insurance against current diversion and practically zero maintenance cost, make them particularly attractive.

HAZARD ARMORED CABLES, Type AC

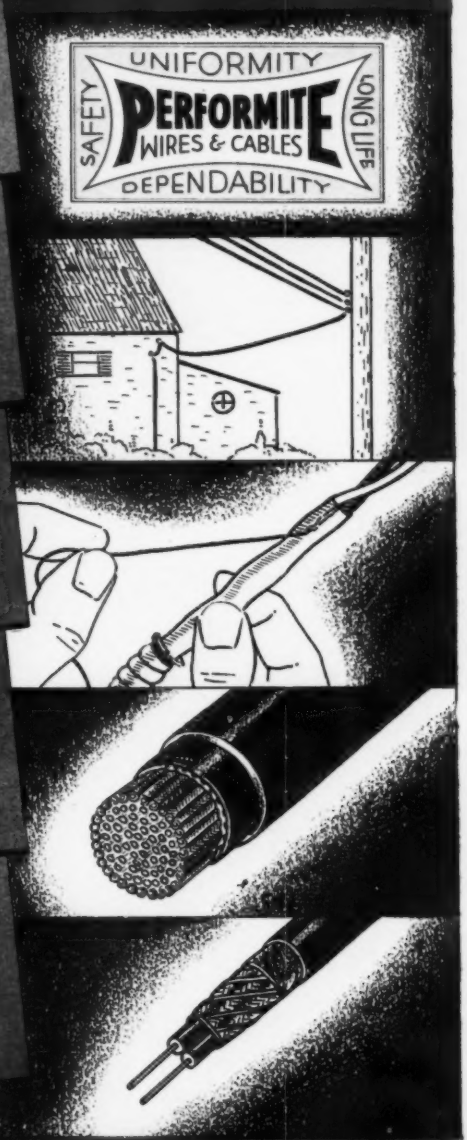
Hazard Armored Cable has a flame resisting, moisture-proof paper sheath between the conductors and spiral interlocked steel armor, a ripcord underneath the paper facilitates installation. Double protection is afforded by the insulating bushing which is inserted at the cut ends over the paper sheath instead of removing the paper as ordinarily done.

HAZARD PERMEX

Thin-wall rubber insulation provides a means of constructing cables containing a maximum number of separately insulated conductors with minimum diameter and weight. It is used for multi-conductor telephone cables, for supervisory control, fire alarm, police signal or other low voltage circuits requiring many conductors in small compass because of limited duct space.

TRIAL INSTALLATION CABLE (Interior Wiring)

CNX Covered Neutral Cable is designed for use in houses, buildings of frame construction and all types of farm buildings, including barns, garages, stables, etc. The rules which govern the installation of non-metallic sheathed cable also apply in a general way to the installation of CNX Covered Neutral Cable.



HAZARD INSULATED WIRE WORKS

Division of The Ohio Brass Company

Works: Wilkes-Barre, Pennsylvania

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New York Chicago Philadelphia Pittsburgh Buffalo Boston Detroit
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NOFUZE LOAD CENTER for larger homes, small stores, having from 9 to 16 circuits. Equipped with "De-ion" Multi-Breakers.

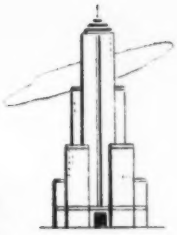
NOFUZE LOAD CENTER for small homes having from 1 to 8 circuits. Equipped with "De-ion" Multi-Breakers.

NOFUZE MULTI-BREAKER PANELBOARD for commercial buildings. Available with 4 to 40 circuits. Prices comparable with switch and fuse types.

NOFUZE OIL IMMERSED PANELBOARD for hazardous locations. Equipped with "De-ion" circuit breakers.

NOFUZE SWITCHBOARDS save from ⅓ to ½ the space required for ordinary types. Completely dead-front Easy to wire.

COTTAGE OR SKYSCRAPER HOSPITAL OR COAL MINE



CIRCUIT *protection*

No matter how small . . . or how large the wiring job . . . whether in home, hospital or in locations where fire hazards require special equipment . . . you'll find Westinghouse Nofuze "De-ion" equipment available for the protection of electrical circuits.

Load Centers for homes, panelboards for commercial structures and industrial plants, low-voltage distribution switchboards, breakers for motor circuits, and oil-immersed panelboards for oil refineries, chemical plants, and similar applications—all now can be Nofuze equipped. *Best of all,*

Nofuze circuit protection costs little if any more than switches and fuses.

Safe, tamper-proof, easy to operate after an overload or "short" has opened the circuit, Nofuze protection, made possible by the "De-ion" principle of arc interruption, rapidly is becoming America's standard. Millions of circuits now are protected the Nofuze way.

Why not get complete information today on Nofuze circuit protection. Write Westinghouse, Room 7-N, for catalogs. J-60131

WESTINGHOUSE ELECTRIC

Westinghouse

Questions ON THE Code

Answered by
F. N. M. SQUIRES
Chief Inspector New York Board of Fire Underwriters

Grounding

Q. *"In a number of residence units we have services consisting of three #4 wires in 1¼" conduit. Is a one conductor #8 armored cable ground wire large enough for a common ground, for service conduit and neutral conductor? According to second column of the table in "908 I" it is. According to the first column of the table, it is not.—W. D."*

A. The National Electrical Code requires the use of a #6 wire for the purpose of grounding a 1¼" service conduit. This requirement is found in the first column of the table in 908-1. The second column of this table refers to the size of the conductors of service entrance cable type SE, ASE, or USE according to usage.

A conductor of this size will satisfy the requirements for a common grounding conductor used for both service and equipment, providing the requirements as to connection to proper ground electrode has been fulfilled.

Protecting Service Cable

Q. *"I desire a correct interpretation of section 404, paragraph b, of the National Electric Code, with reference to whether it is necessary to place guard strips or covering on service cable, where it extends from the usual meter base down the side of the building on a line with basement ceiling. Any information will be greatly appreciated.—E.H.R."*

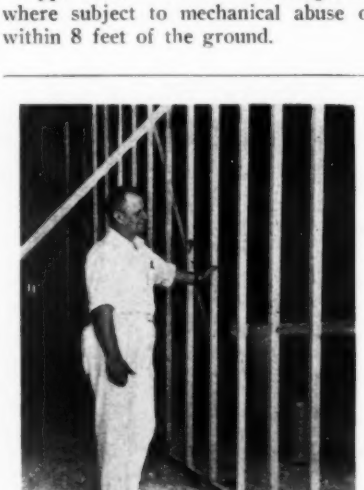
A. The last sentence of 404-b reads "Service entrance cable, if liable to contact with awnings, swinging signs, shutters, etc., or if within 8 feet of the ground and subject to mechanical disturbance, shall be of the protected type."

This "protected type" refers to a specific type of cable made by various manufacturers and called the ASE or "protected type." While the initials ASE seem to indicate Armored Service Entrance the presence of an armor is not the criterion by which this type is judged, although at present all of the service entrance cable with inter-locking armor is of the ASE type. But cables, if built to withstand the "60 lb. impact test", whether with an armor or not can be classed as ASE cable.

Service entrance cable is divided into 3 types—

Type S. E. for use above ground, as on the side of a house, where not subject to mechanical abuse and where above 8 feet from the ground, unless in conduit or electric metallic tubing.

Type A.S.E. for use above ground where subject to mechanical abuse or within 8 feet of the ground.



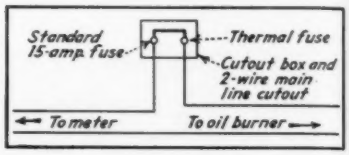
***SPREADING OUT**—W. L. Fowler, Fowler Electric Company, Cedar Rapids, Iowa, will soon have one of the most modern electrical contracting houses in the middle west. Here he is directing the workmen in remodeling his new store. He also finds time from his large electrical contracting business to lend his aid to the National Electric Code Committee of which he is one of the four contractor members.*

Type U.S.E. for use underground.

Then there is another service cable often classified as service entrance cable but really called "Service Drop Cable" type S. D., for use only from the pole to the service head on the house.

Protection of Automatically Started Motors

Q. *"I have been getting violations on some of my oil burner jobs, as to the method of which I am using thermal protection, although each job is done alike. Below is a sketch of the*



method I am using and I feel that it should cover the new ruling on small motors. As I do a considerable amount of oil burner work, I would appreciate an early response as to your opinion in this matter, so that I can clear up the pending violations which I have.—H. F. T."

A. The arrangement shown on your sketch will not be satisfactory inasmuch as it will not afford the protection required. The regulations require that each automatically operated motor of ⅛ to 1 H.P. be protected by an inherent overheating device or by a protective device of a rating at not over 140 per cent of the ampere rating of the motor.

To connect a fuse or a time lag fuse of that value in the motor circuit with other devices also dependent upon it, would mean that the fuse would probably not hold during the starting of the motor. On the other hand, to add ampere capacity to provide for the capacity of other devices such as the ignition transformer, control transformer, clock, etc., would not give proper protection to the motor. The time lag fuse should, therefore, be connected in the motor circuit so as to carry only the current of the motor itself and not the current of any other devices.

NEMA Code Analysis Ready

An analysis of the 1937 revision of the National Electrical Code has been compiled by NEMA. This booklet provides an authoritative interpretation of the changes in the Code, as was simi-

How the FUSTAT makes *feasible* a NON-TAMPERABLE FUSE

Resists Tampering — Stops Over-fuseing

A Fustat cannot be replaced by a penny or slug — and it is practically impossible to bridge it with tinfoil, strands of lamp cord or any other material.

Stops use of over-size fuses — a 20 or 30 ampere Fustat will not fit in a 15 ampere receptacle or adapter. Similar limitations apply to all other sizes.

Once you have installed the correct size to protect, your protection cannot be taken from you.

Adapter fits Edison base fuse holders and locks in place.
Retails at 7½c

But that's not enough . . .

A non-tamperable fuse that would blow on starting currents would be an impractical device — a terrible nuisance — so the Fustat . . .

Wipes out any excuse *for* Tampering *because* it won't Blow Needlessly . . . .

A Fustat won't blow when washing machines, refrigerators or other motors start. A 15 ampere Fustat will permit you to load an ordinary circuit to capacity — and yet not blow on motor starting.

It gives you SAFE PROTECTION without USELESS SHUTDOWNS.

Protects flexible cords against burnout — in spite of its long time-lag

The Fustat contains a fuse. The ability of a fuse to protect against dangerous cord shorts or grounded sockets is well known.

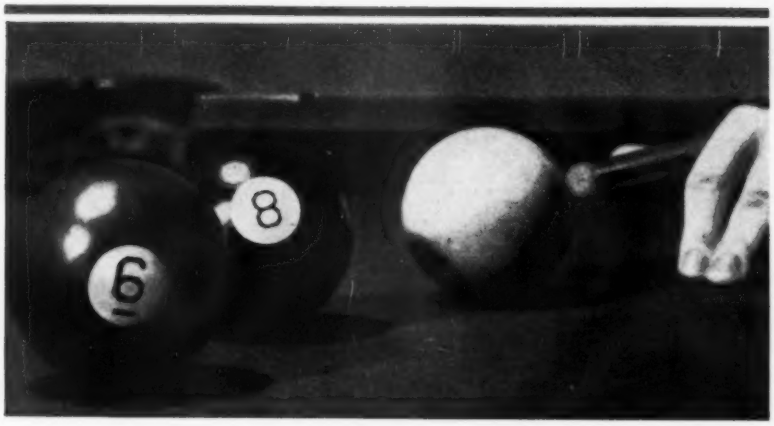
The Fustat – HOLDS like a LARGE FUSE when safety permits, yet, OPENS like a SMALL FUSE when safety demands

Today's circuits demand the Fustat — *for what other device can . . .*

1. Make safe protection remain safe.
2. Stop loss of money on needless "blown fuse" service calls.
3. Permit adding more appliances to present circuits.

The FUSTAT

RETAIL PRICE ONLY 7½c



GET OUT FROM BEHIND THE 8-BALL!

Threaded type in all popular styles

No-Thread type in all popular styles

● Why put yourself in the position of running up high installation costs when Appleton "35 Line" Unilets are easily and quickly installed.

With Appleton "35 Line" Unilets, the rounded ends of the cover opening and the absence of ear lugs give more wiring space, and save time and money.

Appleton "35 Line" Unilets are made of malleable iron—giving both strength and lightness in weight. Their cadmium finish provides positive resistance to rust and corrosion.

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APPLETON

Threaded and No-Thread Malleable

Standard for Better Wiring **UNILETS**

Reg. U. S. Pat. Off.

Questions on the Code

[FROM PAGE 142]

larly provided for the previous Code revisions of the 1931, 1933 and 1935 editions.

In the analysis, comments are confined to those provisions which have been revised, so as to have a different effect from the former text. No note is taken of 1935 Code provisions which have been changed only in wording, or which have been split up. For ready reference when commenting upon revisions that have been made, in many instances, the paragraph numbers of the 1935 Code have been mentioned.

This booklet again compiled by A. B. Smith, may be obtained for 10c. per copy from the National Electrical Manufacturers' Association, 155 East 44th St., New York City.

***GENIAL INSPECTOR**—Art Welklin who reigns over the electrical inspection department in Ft. Wayne, Ind., city hall enforcing the new city electrical ordinance. He has armed himself with a camera and flash gun in his campaign against hazardous wiring. Pictures will tell the story when he talks over unsafe conditions with the owner.*

Stopping Fixers

Chief electrical inspectors are eternally plagued by political fixers, interceding for disgruntled electricians who flunk their contractor license examinations. The inspector in an eastern city has solved this problem. He asks all city-official fixers, for a signed letter on their official or business letterheads stating that said fixer will assume full personal responsibility for all electrical fires, accidents, claims for malpractice, etc., for which the flunked applicant may be responsible, if given a contractor's license. Since adopting this policy, political license fixers have left this inspector alone.

When you install

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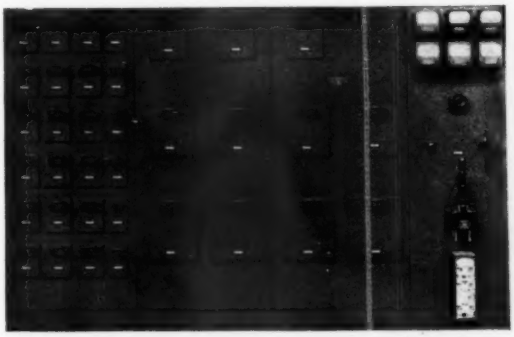
★ THE UTMOST IN CONVENIENCE
★ COMPLETE DEPENDABILITY
★ ALL AROUND SATISFACTION

WURDACK REMOTE CONTROL STAGE SWITCHBOARDS

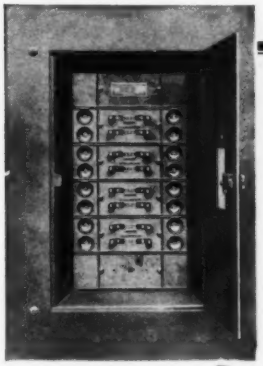
Are designed for all types of Theatres, Auditoriums, Fraternal Buildings and Schools where a modern system of lighting control is desired. Outstanding features are simplicity of design, convenience of arrangement and ruggedness of construction. Each installation is carefully engineered to meet its peculiar requirements.



WURDACK DEADFRONT SWITCHBOARDS

Of the Auto Shift Type are constructed of one-piece cold rolled steel panels with openings cut for individual Auto Shift Switch Units. These units are so constructed that all parts are dead when door is open. Fuses are mounted on insulated bases on back of steel inclosure eliminating all heavy parts from door.

There's good money in this line. Wurdack offers you the kind of equipment that enables you to establish a real reputation for reliability. The complete line includes panelboards, circuit breaker panels, distribution panelboards, and remote control stage switchboards. All are designed to most effectively meet today's requirements—and there is always the right size and design for the job. Outstanding features are design simplicity and ruggedness of construction. Write for details.



WURDACK PANELBOARDS

● A complete line of Dead Front Lighting Panelboards, constructed of standardized sections of moulded Bakelite. All switches and fuse receptacles are readily removable from front of panel. All Cabinets made of Code Guage Galvanized Steel. Fronts of full finished cold rolled steel, rust-proofed with black lacquered finish.

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Questions ON Signalling

Answered by
ALBERT A. SCHUHLER

Tapper bells with large bells

Q. "In a battery operated closed-circuit fire alarm system, a number of tapper bells are being used for signaling. It is desired to add some direct-acting loud ringing single stroke bells at certain points. How may these bells be connected in the circuit?"—S.B.

A. Single-stroke bells of the solenoid type cannot be connected directly in the line with tapper bells. They will not operate on the low currents for which tapper bells are designed.

To connect single-stroke bells in the system, it is necessary to use either of two methods. First, place a relay in series with the tapper bell loop, and use the contacts of the relay and a source of current to operate the single-stroke bells. Second, attach a pair of contact springs directly to the armature and the base of the tapper bell, using these contacts and a source of current to operate the single-stroke bells.

Recent practice has been to use the second method, and to select a nearby 110-125 volt circuit to supply current to the single-stroke bells. This method does not change any of the characteristics of the present tapper bell loop.

Hold-up alarm systems

Q. "What type of contactors are found preferable for mounting on counters, and floors in hold-up systems? Consideration to be also given to the prevention of false alarms."—G.M.

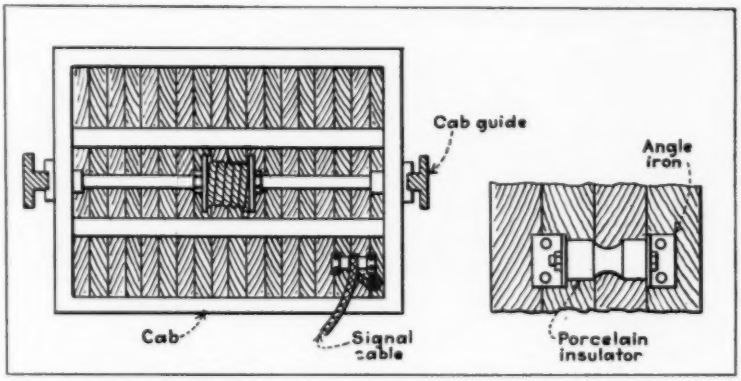
A. It is now generally accepted, that double pinch button stations should be used on counters and desks. For floor contacts, the foot rest type, foot rail contactor having the protected rail, has gained in favor, and is considered being preferable. The double pinch button station requires the pressing of two separate contactor units simultaneously, in order to complete the circuit in an open-circuit system, or to open the circuit for a closed-circuit system.

The foot rail contactor permits resting the feet on a platform. But the rail, which is mounted below the platform, must be deliberately raised by the tip of the foot, in order to send in an alarm. Any of the above units may be furnished in the locking or non-locking models.

Strain support for annunciator cables

Q. "What suggestion have you to offer to reduce the breaking of wires in elevator annunciator cables? We have noticed that the wires often break at the point where the cable enters through the floor of our freight elevator."—J.D.

A. It is evident from your description, that the cable simply runs through an opening in the floor of the elevator, without any means of support. Unless something is done to eliminate the constant wear at this opening, the trouble will continue, as there is a large strain at the point where the cable enters the cab. It is best, therefore, to provide a strain support. In addition the strain will also be taken away from the terminals in the annunciator. The accompanying illustration shows a simple way to overcome this trouble.



STRAIN SUPPORT *to prevent wear on elevator annunciator cables.*

Elapsed time recorder in watchman system

Q. "Would you suggest a method as to how we can use a pen type elapsed time recorder with a watchman's report system? The elapsed time recorder operates on 110 volts 60 cycle A.C."—G.S.

A. An elapsed time recorder of this type, may be readily used by simply installing single-pole cylindrical lock switches, such as are used in lighting circuits, and placing them at remote points throughout the institution. To operate these stations it is necessary to insert a key, and turn it to close the circuit. To open the circuit, turn the key to the original position.

The wiring is very simple. It consists of one common feeder wire to one terminal of all stations, one common feeder wire to the elapsed time recorder, and one section wire directly from each outlying station to its respective circuit terminal in the elapsed time recorder. It is the same type of circuit used in simple annunciators.

Announcing Office Callers

Q. What would be the most practical way to provide concealed wiring and devices to serve as an automatic entrance signal in the reception room of an office suite? The signal should be so equipped that it need only be in operation when there is no one on duty in the reception room.—E. M.

A. The new Professional Arts Building, at Hagerstown, provides its doctors' and dentists' suites with a re-

IN THE MODERN MANNER*

Special cabinets and metal connecting troughs built by Walker were used to transform the dangerous, out-of-date job at the left to the completely modern installation above. Note the total absence of exposed wiring in the picture above.

* Modern construction practices demand electrical installations that are up to the minute in safety, convenience, and trouble-free service.

Walker steel and aluminum enclosures for all types of electrical installations are built to anticipate the modern trend.

Write us for quotations on your next job.

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Connectors and Couplings for thin wall conduit

ONLY A SCREW DRIVER NEEDED TO INSTALL

No special tools — no wrenches — no struggling to install. Screw driver only is needed. Vibration can't loosen. Easy to install in corners and hard-to-get-at places. Approved by Underwriters. Patents pending. If your jobber cannot yet supply you—write to us.

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WIRING MATERIALS

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CHICAGO, ILL.

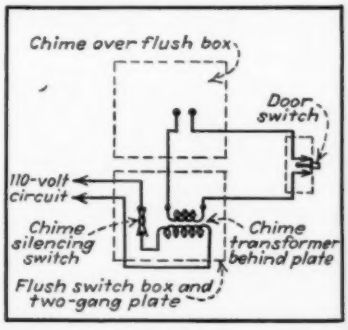
Questions on Signalling

[FROM PAGE 146]

finement for automatically announcing the entrance of patients. When a reception room door is opened, an automatic switch closes the circuit to a two-tone chime, informing busy medicos that a caller has arrived in the reception room. When a nurse or receptionist is on duty, there is a cut-off switch for silencing the chime.

As installed by The Lamp Shoppe, this outfit comprises a normally-off door switch, a chime beside the door and an operating transformer. All

FINISHED VIEW—Beside each door the chime and concealed transformer announce callers when automatic door switch is operated.



RECEPTION CHIME—Doctor's office suites have door switch and chime at reception door for announcing callers, when nurse is not on duty.

wiring was concealed by using a two-gang switch box, which contains the switch and small transformer. There is a two-gang plate for the tumbler type cutoff switch, for covering the transformer, and for covering the connections made to the chime installed directly above. The 110-volt tap to the transformer was made from the general reception room circuit.

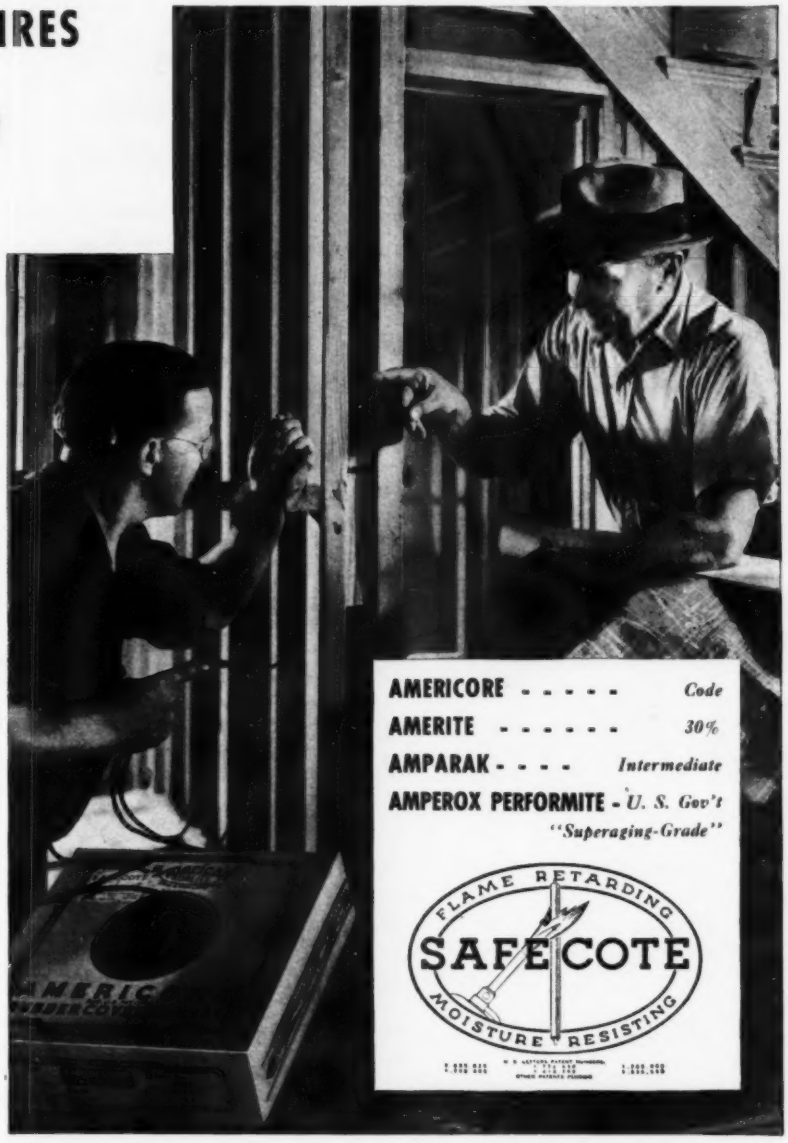
Prepare for Tomorrow's Electrical Living . . .

INSTALL GOOD WIRES *Today*

REFRIGERATION—air conditioning—electrical cookery—better lighting—all these features are planned in modern buildings. Now, more than ever, it is important to anticipate heavier future loads. The wires you put in today will have a big job to do tomorrow.

Install wires that you can rely upon to carry these heavier loads with safety. Americore, Amparak, Amerite and Amperox Performite—all building wires manufactured by the American Steel & Wire Company—will not crack with cold or soften with heat. They are impervious to moisture. All are protected by the well-known Safecote finish, which will not carry or support a flame. They are readily installed . . . they "pull" easily . . . are clean to handle.

These wires are available in all standard colors. To fully demonstrate their safety, economy and ease of handling, we will be glad to send you samples of these wires on request. Write for our complete, informative catalog on Building Wires and Cables.


AMERICORE - - - - - Code
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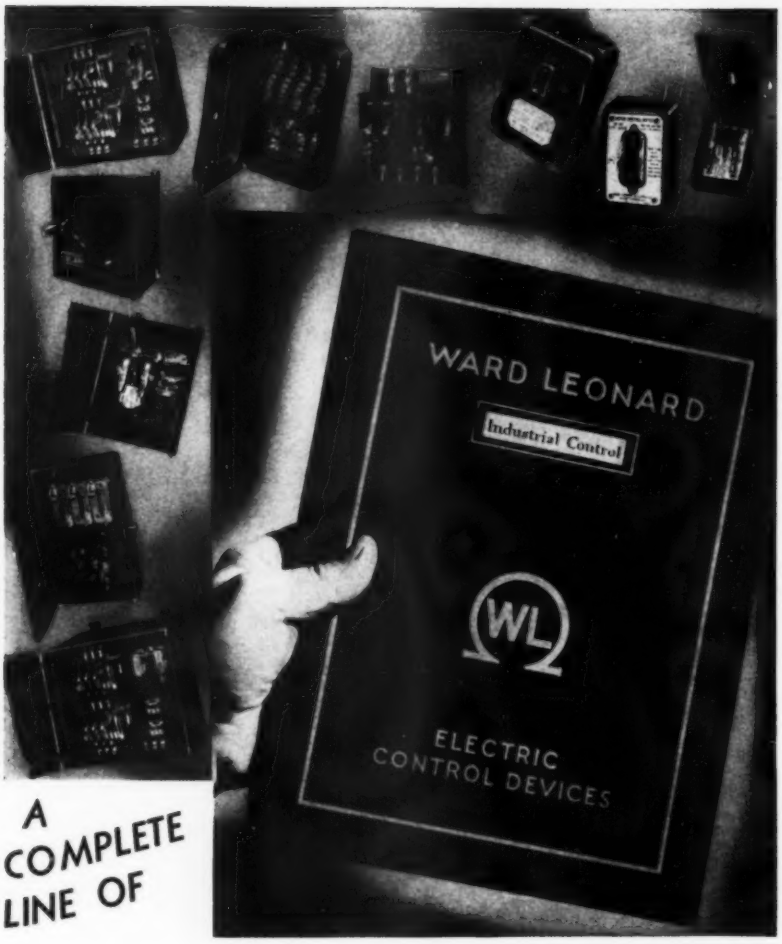

A COMPLETE LINE OF

MOTOR CONTROLS

Here is complete information of Ward Leonard Motor Controls, Disconnect Switches, etc. including sizes, ratings and prices under one cover, indexed and arranged for your convenience. A complimentary copy will be gladly sent upon request.

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48 SOUTH STREET, MOUNT VERNON, N. Y.

ELECTRIC CONTROL DEVICES SINCE 1892

Questions & Signalling

[FROM PAGE 149]

Adding punch recorder to fire alarm

Q. *It is desired to add a spring wound punch recorder and take-up reel to a present closed-circuit coded fire alarm system, so that a record may be made of drill and alarm signals. The system operates on 110 volts 60 cycle ac, and is supervised by a 6 volt storage battery. What change or addition must be made to the present system?—E.H.*

A. To connect the punch register, connect this unit to the trouble bell contact springs of the relay, provided on the control panel for that purpose. It is assumed that the punch register is of the open-circuit type. The contact springs will make and break the circuit, in line with the code being transmitted. The 6 volt feeder wire must be extended to the register to complete the circuit.

Annunciator drops in series with bells

Q. *"We have recently increased the size of our alarm system. Each electrical reset drop in the annunciator is connected in series with a polarized non-contact vibrating bell located at remote points. The operation is such, that when certain doors are opened, a door switch closes the circuit. This action operates a corresponding drop in the annunciator located in the watchman's office, together with its associated bell located near origin of alarm. In addition a general alarm bell operates with all calls at the annunciator.*

In making the addition, we find that some of the runs are about 250 feet away from the annunciator, and while the bells operate fairly well, the drops on these runs do not function. There are only a few circuits which do not operate properly. The system operates on 30 volts 60 cycle a.c. No. 14 wire is used throughout. Can you suggest an inexpensive way to correct this trouble?" —L.B.

A. It is quite obvious that the drops in the annunciator, connected to the long runs, do not receive sufficient current. This difficulty may be overcome by connecting a 40 or 50 ohm resistor across the terminals of each bell, on the long runs. This will permit sufficient current to pass to the respective drops.

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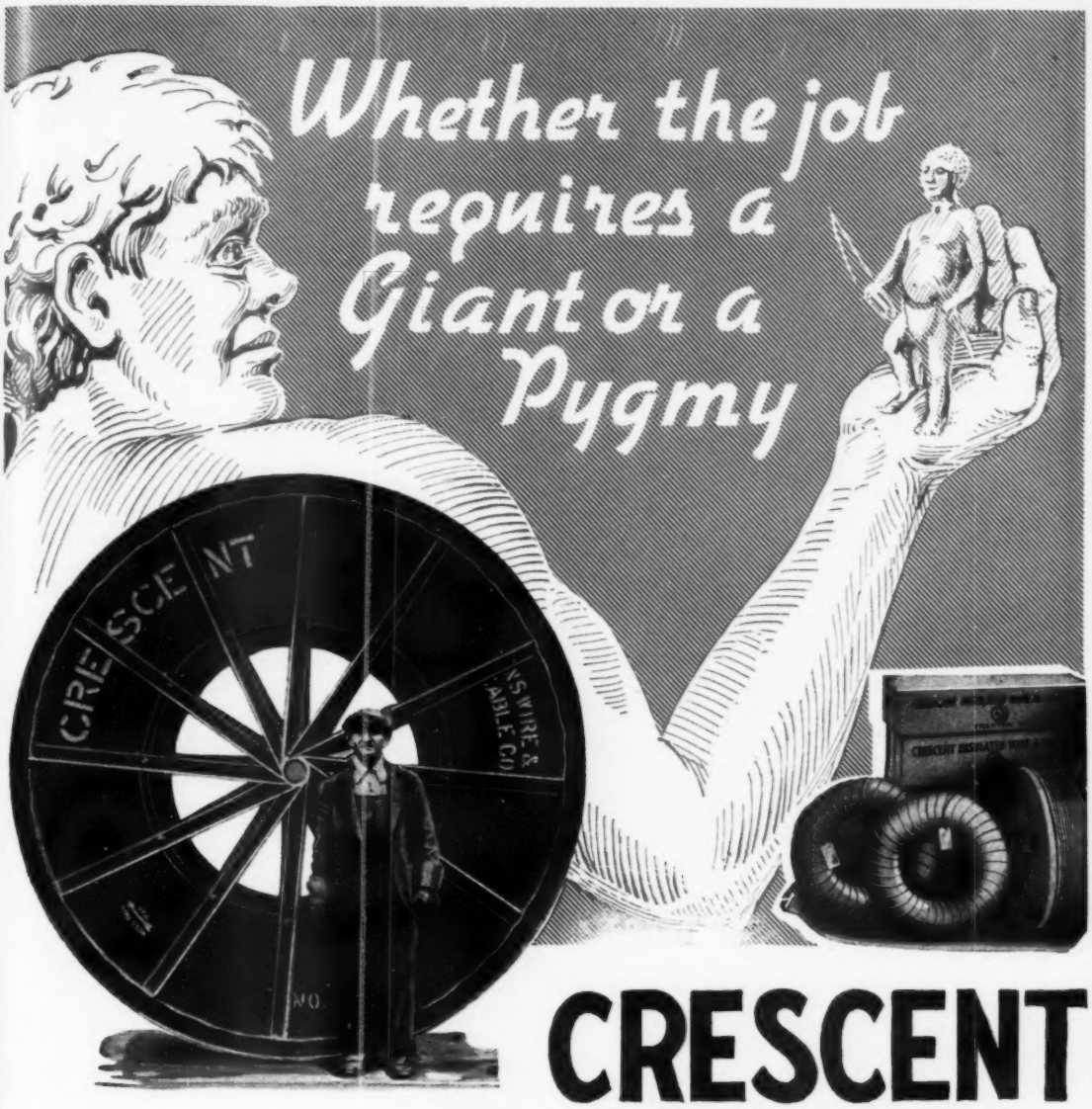

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Reel of large size
PARKWAY CABLE
in exceptionally long lengths used to feed power on a New Mississippi River Dam

Whatever the load—power for a mammoth dam or a simple house wiring job—the comprehensive CRESCENT line can furnish you with Wires and Cables exactly suited to your needs.

And Crescent can give you that close, personal type of service which you can expect only from a medium sized, closely knit organization, producing the entire line in one plant, under one management.

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Jobber Co-operation — A Permanent Policy

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In the News

BIG NEW DRIVE ON BETTER HOMES

Another national campaign to promote electricity in the homes is now raging. General Electric Company's Home Bureau has enlisted more than a hundred power companies in a double barreled contest, national and local. Entry forms are to be sent to more than eight million homes. It is all linked to "The Electrical Standard of Living."

Under plan "A," grand prizes of two "New American Homes", worth $12,000 and $8,000, are to be awarded for the two best 100-word letters received describing how "The Electrical Way of Living" appeals to the contestant. Also for a period of ten weeks there will be additional weekly awards of $200 to the ten best letters received. The first week's ten awards will be announced October 11th, and the final week's awards on December 7. Grand Prizes will be announced December 27.

Under plan "B," the local Home-Building Contests will be organized to encourage sound construction, good architecture, quality materials, approved equipment and "Better Living" in the broad sense of the term. A series of awards are to be offered, based on ten major elements in good home building.

(1) Good location and architecture, (2) Sound construction and skilled labor, (3) Quality materials and equipment, (4) Landscaping and interior decoration, (5) Sound financing, (6) New materials, (7) Plumbing and sanitation, (8) Heating and air conditioning, (9) Insulation and sound-deadening and (10) Electrification, covering: a, wiring; b, lighting; c, electric kitchen; d, electric laundry; e, automatic water heating; and f, other electrical services.

Final judgment of these awards will come not later than November 19, 1938.

TRAINING YOUTHS FOR MAINTENANCE

In Los Angeles, rapid headway is being made with a program to provide training for youths desiring to enter the electrical maintenance trade. Electrical Maintenance Engineers Association, affiliated with the Electrical Development League of Southern California is conducting it.

Candidates must be 17 years of age. Articles of acceptance are signed by the applicant, the parent, and the prospective employer. Apprentices are limited to one for every five journeymen. Wages are fixed over a four-year period at a certain scaled percentage of the journeyman wage.

Periodic examinations are given apprentices under the following program—

1. *First year*—All apprentices with no previous experience attend a trade preparatory school for 800 hours before being indentured to an employer, with credit given for ten months training on his first year apprenticeship.

2. *Second, Third and Fourth Years*—Minimum of 1800 hours trade work on the job and 144 hours instruction in trade school, during each year.

3. The school instruction shall be confined to trade, technical, and related technical subjects, and such instruction in citizenship as may be necessary to prepare the apprentice to become an asset to the community.

The schedule of processes to be learned and jobs to be done, during the four-year period, covers every phase of installation and maintenance of electrical equipment. The Apprentice Committee, representing the E.M.E.A., the employees, and the board of Education, supervises the operation of the plan and has power to suspend or revoke indentures of apprentices for infraction of rules or improper conduct.

Those desiring full details on the program may address F. L. Hockensmith, General Manager, Electrical Development League of Southern California, Chamber of Commerce Building, Los Angeles.

***BRIDGE PARTNERS**—When careful bidding makes a success of two big jobs partners feel good about it. In the case of Frank Gentles and Ted Rosenberg, it is time out for congratulations over a really big-time bridge game. Their firm, the Alta Electrical and Mechanical Co., Inc., of San Francisco installed the electrical systems for both the Golden Gate and the San Francisco-Oakland bridges. Two tough assignments worth shaking hands about.*

TRAVELING LABORATORY

Moving his bright red automobile field laboratory from town to town, Ray J. Lariabee, Western field engineer of the Underwriters' Laboratories, Inc., last year covered the entire eleven Western states. He tests electric wires and cables, conduits and fittings, taken from the regular display and construction stocks of electrical contractors and wholesalers. Where a sample is found to be defective, a second sample from the same stock is shipped to the Chicago laboratories for a double check.

***RAY LARIABEE** in his automobile laboratory, testing wiring materials from local stocks in the Far West.*

Electrical inspectors, contractors and wholesalers have cooperated and many public exhibitions of the testings have been held. And the fact that the laboratories make field tests has built public confidence in the Underwriters' label and in the standards of quality of the manufacturers who use it.

LEAGUE CONFERENCE IN NEW YORK

The Second Annual Conference of the International Association of Electrical Leagues is to be held in the auditorium of the Electrical and Gas Association of New York, on October 6 and 7. Nationally known speakers will address the conference on all phases of electrical business development.

National and local cooperative business development activities are scheduled for discussion include: National Kitchen Modernizing Activity; Electrical Housewares Program; Adequate Wiring; Cooperative Dealer Merchandising in the Metropolitan New York Area; Street &

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HERE YOU NEED IT

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The name that means everything in electricity

NATIONAL DISTRIBUTING ORGANIZATION WITH 71 BRANCHES

Highway Lighting Safety Through Lighting; Institutional Safety; Air Conditioning; Range, Radio and Laundry Equipment Promotion; Sales Financing Plans. Other subjects include Electric Water Heating, Better Light-Better Sight, Industrial Modernization, Commercial Electric Cooking Promotion and Electrical Maintenance Engineers Activities.

FOURTH YEAR OF BETTER LIGHT

Better Light - Better Sight makes its fourth annual report. With 19 member associations and organizations of the electrical, optical and paint industries coordinated in this educational work, something like 16,000,000 people have been influenced. Here are some highlights from the activity so far.

1. There are now 7,000 individuals trained to sell better lighting.
2. More than 70 cities promoted Better Sight Week last fall, and 80 cities supported "Save Your Vision Week" in February.
3. Last year 74 national trade and consumer publications published articles or editorials on Better Light - Better Sight.
4. Newspaper advertising totalling 6 million column inches reached a circulation of more than 45 million.
5. More than 200 pages of trade paper ads were run in electrical, paint and optical publications.
6. Radio broadcasting was conducted over 250 stations.
7. Direct mail totalled 16 million pieces, and 150,000 billboard, window and counter display cards were used.
8. Last year 1,100,000 I.E.S. lamps with certification tags were sold, and an equal number not bearing tags was estimated to have been sold.

This program has now reached far beyond the home. Excellent results are reported in office, commercial and industrial lighting.

FULL COMFORT WIRING CAMPAIGN

The Electric Association of Chicago is starting on a new campaign for full comfort house wiring. The program is organized along the lines of the former Red Seal activity. Reports of financing, excavation or other preliminaries to residential building are followed up from the Association office with a letter to the owner outlining the many advantages of a full comfort wiring system.

A schedule of the minimum standards of adequacy, based upon the Handbook of Interior Wiring Design, is presented in a form which the owner may use to check with his plans. He is also offered the free services of the Architects Service Bureau to help him in planning his wiring system to conform with the standards.

Where the plans comply with the minimum standards, a certificate is issued to the owner, a decalcomania transfer is applied to the service entrance switch to permanently identify the installation, and a large replica of the certificate is displayed prominently on the property during construction.

"THEY BETTER HANG SOMETHING OVER THIS IF THEY WANT US TO GET THIS CABLE SPLICED"

COMING MEETINGS

International Association of Electrical Inspectors — Southern Section, Atlanta, Ga., week of October 4.
Ohio Electrical Contractors Association, Inc.—Annual meeting, Cleveland, Ohio, week of October 5–7.
International Association of Electrical Leagues — Annual Convention, New York, N. Y., October 6 and 7.
American Welding Society — Annual Meeting and Welding Exposition, Atlantic City, N. J., October 18–22.
National Electrical Contractors Association — Annual Convention, Biltmore Hotel, Los Angeles, Calif., October 18–21.
National Electrical Wholesalers Association — Semi-annual convention, Hotel Cleveland, Cleveland, Ohio, October 18–21.
Electrical Maintenance Engineers — Annual Show, Lighting Institute, Chicago, Ill., Oct. 20–22, 1937.
National Electrical Manufacturers Association — Annual convention, Palmer House, Chicago, October 24–30.

MAN PICKER—Helmets were a "must" for those who passed muster with Tom Bennett, to work at dizzy heights on towers or below decks on the Golden Gate and San Francisco-Oakland bridges. Bennett is electrical estimator and general "skipper" for the Alta Electrical and Mechanical Co., Inc., of San Francisco, so had the details of two big bridge jobs to keep protected under his helmet. Despite many work hazards, Tom's crews worked along efficiently with a fine safety record.

MICHIGAN INSPECTIONS AVERAGE $2.72

The second annual report of the Electrical Administrative Board of Michigan shows that its 67 inspectors have an average area of 849 square miles. They cover their work at an average cost of $2.72 per inspection. Michigan's law covers statewide inspection, also the licensing of contractors and journeyman electricians. Having become effective in September 1935, some of the Board's experiences as gained in the first 21 months' operations, are cited.

Outstanding has been the respect and obedience of the home owner to the Law. By education, through wide publicity, the

2-CIRCUIT RECEPTACLE

ONE circuit of this Duplex Receptacle is usually wired so the current is always ON, to permit of plugging in various household appliances. The *other* circuit is controlled by a wall switch as indicated in the illustration. This switch-controlled circuit may be utilized for operating floor lamps and table lamps, saving the bother of turning lamps on and off one at a time.

The 2-Circuit Receptacle is all Bakelite, side-wired. Plates may be had in Bakelite, brass or cream-tinted white IVORYLITE. Separate fuses are used for each of the circuits—15 amperes to the circuit—allowing two heavy loads from each receptacle without blowing fuses. These features make the 2-circuit outlet the EXTRA-Convenience Outlet for your modern homes.

SOLD THROUGH YOUR ELECTRICAL WHOLESALER

HART & HEGEMAN DIVISION

THE ARROW-HART & HEGEMAN ELECTRIC CO. HARTFORD, CONN.

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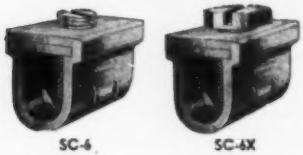
Sherman Wedge-Grip Connectors



SC-6 SC-4X

FOR SERVICE ENTRANCE AND ALL SMALL WIRE CONNECTIONS

Novel But Simple Construction Provides Safety and Economy

Makes quickest, strongest, safest solderless connection at lower cost.

Tough Bronze Screw—Copper Body.
Wide Range of Wire Capacity.
Two Types of Screws.

Free samples furnished on request. Write for sample and Trade Bulletin No. 22 to

H. B. Sherman Mfg. Co.
Battle Creek, Mich.

BELLS

DOOR BELLS • • • BUZZERS
SKELETON BELLS

WEATHER-PROOF VIBRATING BELLS
TRANSFORMERS

Widely known for quality and low prices—a complete line. If your jobber does not stock Signal Bells, Buzzers, and Transformers, write

SIGNAL ELECTRIC MFG. CO.
Menominee, Michigan

SIGNAL

In the News

[FROM PAGE 154]

average individual, especially the farmer, has gained some knowledge of electrical inspection and he realizes the benefits.

A large percentage show keen interest in the actual inspection, and because the inspector is equipped with testing equipment, many defects are located.

The past year fifteen electrical contractors association groups were formed.

Here are some Michigan statistics—

Total population of state.	5,093,000
Population having own electrical inspectors	2,339,727
Population served by E.A.B.	2,753,273
Number of E.A.B. inspectors	67
Average population per inspector	41,093
Average area per inspector	849 sq. mi.
Licenses issued from 9/22/35 to 6/30/37....	15,768
Inspection Fees from 9/22/1935 to 6/30/1937.	145,808.15
Total Revenues	201,783.73

The personnel of the Electrical Administrative Board consists of L. P. Dendel of Lansing, Chairman; Lloyd Coons, Detroit; James Kelley, Jackson; A. P. Schramke, Saginaw; J. G. Spaulding, Detroit, and C. E. Gauss of Lansing. Albert T. Babbitt is chief electrical inspector in charge of office and field work and Lloyd J. Branch and Eugene T. Eastman are field engineers.

WESTERN INSPECTORS IN CHICAGO

Meeting in Chicago, Sept. 20 to 22, five hundred members of the western section of the International Association of Electrical Inspectors devoted the major part of their convention to a detailed study of the 1937 revised Code. Each article was presented and members revisions talked over.

Addresses by men of the electrical industry were sandwiched between the Code talks. An elaborate entertainment program, starting with a visit to the Underwriters' Laboratories, was climaxed by a dinner dance and entertainment at the Hotel La-Salle.

Among the highlights were addresses by L. W. Going of Portland, Ore., International President, and V. H. Tousley, International Secretary. C. K. Cregier spoke on the problems of inspection in the Chicago area. J. W. Whittington, of New York, outlined what the inspector should do to keep the public informed of the work he is doing. Henry P. Chandler of Chicago discussed the importance of civil service protection for electrical inspectors. R. D. Barry of Louisville, Ky., told of inspection after the recent floods.

Five representatives of industry groups discussed closer cooperation. D. J. Talbot of Chicago spoke for the inspectors. A. J. McGivern, of Chicago, for the wholesalers, called for elimination of black pipe and boxes, also labelling of complete cord sets. L. F. Adams of Schenectady, for the manufacturers, urged inspectors to interpret the code uniformly. George Andrae of Milwaukee, for the contractors, asked for more provisions in the Code to protect the lives of people as well as their property and called on the power companies for standardization of service entrance equipment. C. V. Sorenson, of Indianapolis talked for the utilities.

Earl Whitehorne, editor of *Electrical Contracting*, urged the inspector to face the grave industry problem of inadequate wiring in existing buildings. A revolution must come, he said in wiring methods. G. S. Merrill of Cleveland presented the "Handbook of Interior Wiring Design."

Election of officers placed Clifford Anderson, of Oklahoma City, in the chair as the new president. L. P. Dendel of Lansing

SMART SHOWROOM—Of Clapp, Rose and Vaughn, Inc., Waterbury, Conn., assures the customer that he is dealing with a progressive and reliable house. To reach the offices on the second floor you pass a display of well-placed attractive merchandise. An illuminated directional sign points the way to executive and sales offices where industrial wiring, oil burners and supplies are handled.

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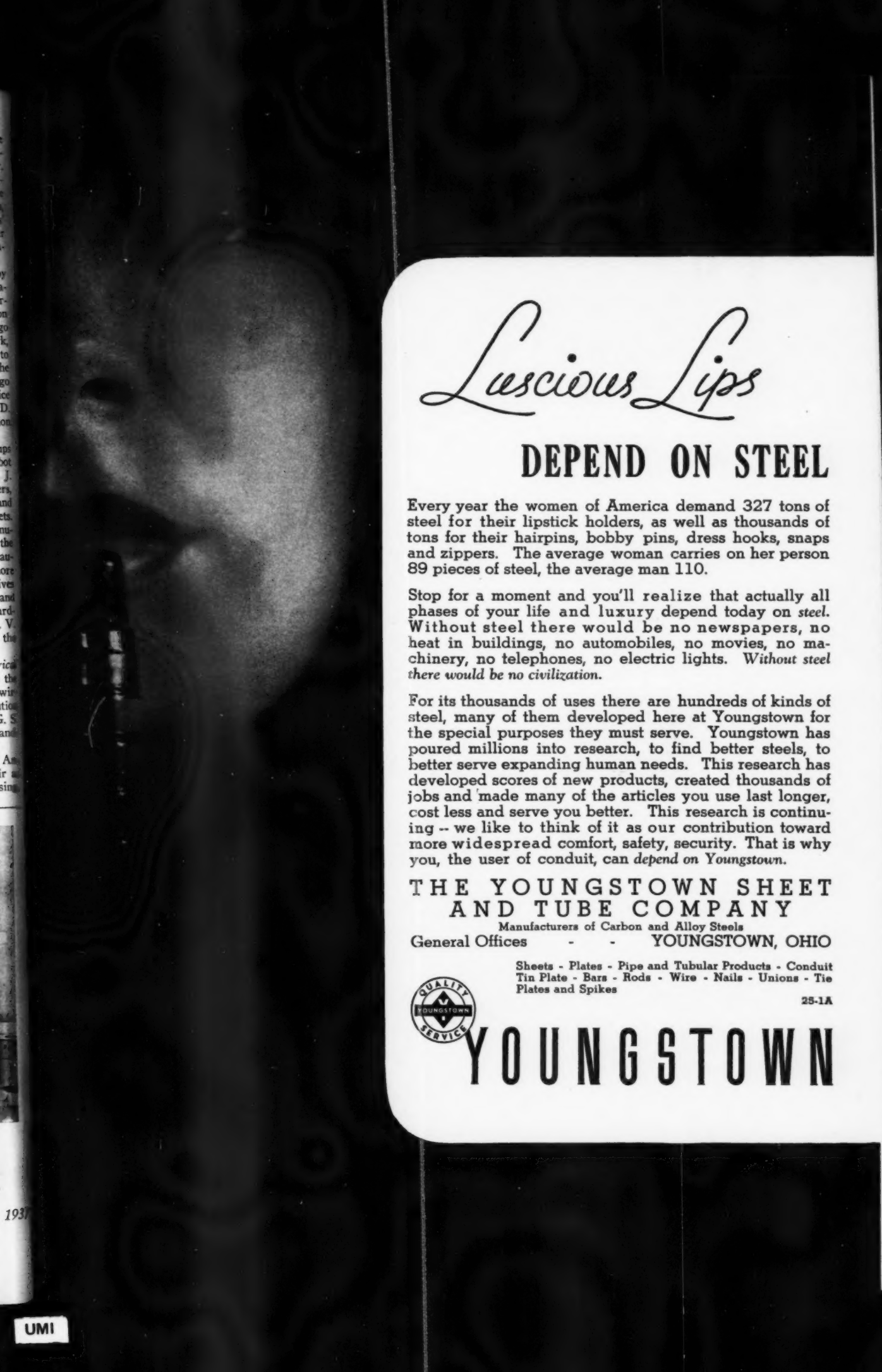

Luscious Lips

DEPEND ON STEEL

Every year the women of America demand 327 tons of steel for their lipstick holders, as well as thousands of tons for their hairpins, bobby pins, dress hooks, snaps and zippers. The average woman carries on her person 89 pieces of steel, the average man 110.

Stop for a moment and you'll realize that actually all phases of your life and luxury depend today on *steel.* Without steel there would be no newspapers, no heat in buildings, no automobiles, no movies, no machinery, no telephones, no electric lights. *Without steel there would be no civilization.*

For its thousands of uses there are hundreds of kinds of steel, many of them developed here at Youngstown for the special purposes they must serve. Youngstown has poured millions into research, to find better steels, to better serve expanding human needs. This research has developed scores of new products, created thousands of jobs and made many of the articles you use last longer, cost less and serve you better. This research is continuing -- we like to think of it as our contribution toward more widespread comfort, safety, security. That is why you, the user of conduit, can *depend on Youngstown.*

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon and Alloy Steels

General Offices - - YOUNGSTOWN, OHIO

Sheets - Plates - Pipe and Tubular Products - Conduit Tin Plate - Bars - Rods - Wire - Nails - Unions - Tie Plates and Spikes

25-1A

QUALITY YOUNGSTOWN SERVICE

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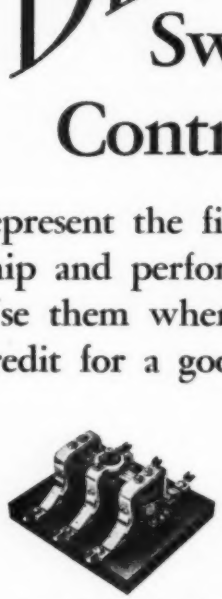
DIAMOND TRADE MARK H
Switches and Control Devices

represent the finest in design, workmanship and performance.
Use them wherever they apply and get credit for a good job.



Type F, R.C. Switch

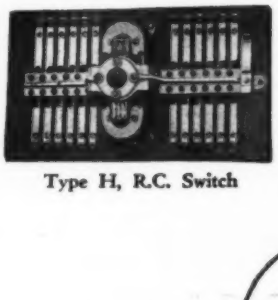
Remote Control for all kinds of Lighting Circuits

Type "F" may be used for all general applications such as flood, window and sign lighting, office buildings auditoriums, wherever many circuts are used.

Type G, R.C. Switch

Automatic Changeover R.C. Switch

This important switch should be used where emergency circuits are needed as in Theatres, Schools, Hospitals, where life is in danger if main supply fails. Switches automatically from one to other.



Type H, R.C. Switch

A Multi-Circuit R.C. Switch

In wiring a home and grounds, warehouses, docks storage places, use this switch, with master switches conveniently located to instantly light premises.

Bulletin No. 10-C describes them. Send for it.

The HART MFG. CO., Hartford, Conn.

In the News

[FROM PAGE 154]

became first vice president and James Galbraith second vice president. F. H. Moore continues in his post of secretary treasurer.

RURAL CO-OP TRAINS WIREMEN

In Whitley County, Indiana, near Ft. Wayne, the Rural Electrical Membership Corporation, set up a school to teach young farmers how to wire their homes and farms. A class of 40 boys were given an intensive training course under an experienced electrician with the cooperation of the state fire marshall's office.

At the end of two weeks of schooling the boys were sent out in pairs under the supervision of the instructor to wire houses. Two weeks of practical experience on the job and the boys became eligible for a diploma, providing their work passed the inspector's approval.

Inspection is required by the co-op on all work installed within its jurisdiction. In addition to meeting the requirements of the National Electric Code, the installation must comply with a number of strict rules to assure adequacy; for example, service risers must be installed in conduit, and a 60 amp. service is the minimum allowed.

Materials for the work installed by the school group are purchased by the members of the co-op at wholesale prices through their farm bureau store. Of the 800 farms in the co-op now wired, 650 were wired by the students and graduates of this school.

COORDINATOR FOR BETTER WIRING

To unite the efforts of the entire industry the Electrical Development League of Southern California has employed Walter L. Stickel as coordinator in an adequate wiring program. The goal set is 4 per cent of the entire cost of a building as the minimum allowance for adequacy. Mr. Stickel will contact wholesalers, utilities, manufacturers, contractor groups, and civic groups to promote wiring in the building enterprise.

Under this coordination plan, the wholesalers' salesmen will explain to contractors that a general, all-industry movement is on, backed by the National Adequate Wiring Bureau. Wholesalers will pave the way for district meetings to be called by the coordinator, and also stimulate wider interest among contractors in range and water-heater sales and installations. Utility men will make contacts with owners, architects and builders, to discuss electrical needs and plans.

The contractors will be given pointers in selling jobs "up," in making use of league sales assistance, and other important phases of public relations.

WIRING HANDBOOK PROMOTION

A lot of good work is being done in pushing the Handbook of Interior Wiring Design into active use. Promotional meetings and lectures, distribution of books to architects and builders, introduction as school text books, and a wide interest among electrical contractors and wholesalers shows real progress in utilization. Among the local organizations reporting actively are—

Electrical League of Kingston, N. Y.
Delmarva Electric Association, Salisbury, Md.
Electrical Institute of the Tri Cities, Rock Island, Ill.
Electric Association, Chicago.
Electrical League of Chattanooga.
Electrical Development League of Southern California, Los Angeles.
Electrical Association of Birmingham.
Electric and Radio Association of Kansas City, Mo.
Electrical League of the Niagara Frontier, Buffalo.
North Central Associated Electrical Industries, Minneapolis.
Electrical Association of New Orleans, La.
International Association of Electrical Inspectors.

HOUSING PLANNERS—Federal Housing projects are under way in Philadelphia too, and the staff of the Electro Construction Co. knows it well. J. V. Botto, at the left, keeps busy with tool and material purchasing details, while W. G. Seemiller has just completed about two months' work on detail drawings for the underground ducts and overhead distribution system for this group of buildings.

STORE LIGHTING OPPORTUNITY

Last year the U. S. Department of Commerce made a survey of 8,108 retail stores and service establishments in 23 cities. It showed 66 per cent of the stores in need of electric signs and 29 per cent in need of better lighting.

The *National Real Estate Journal* now states that 12,000 stores are modernizing with an expenditure of $17,600,000 and that there will be a 44 per cent increase in new store construction involving an expenditure of $46,000,000. So the Edison Electric Institute is organizing a nation wide program to promote store lighting.

"ROME-CABLE"
BUILDING WIRE

There is only one guarantee of wire satisfaction . . . and that is the quality of the wire itself.

Strength and quality are built into every foot of Rome-Cable Building Wire. That is why you can count upon continued customer satisfaction and good-will that leads to the sale of more wire.

ROME CABLE QUALITY

Code, Intermediate 30% and Superaging
Approved by the Underwriters Laboratories, Inc. N.E.C.S.
Flame and Moisture Resistant
Slick finish for Quick and Easy Pulling
Long Aging Rubber
Uniformly Small Diameters
Clean—Easy Stripping
Eight Clear Distinct Colors

ROME-CABLE ROME, N.Y.

PRODUCTS — Hot rolled rods, bare and tinned copper wire, bare and tinned strand, U.R.C. weatherproof wire, cotton, paper and asbestos magnet wire, rubber insulated wires and cords, lead covered cables.

ROME CABLE CORPORATION

SALES OFFICES—New York, Chicago, Philadelphia, Pittsburgh, Richmond, Cleveland, Boston, Dallas, Los Angeles.

No. 130 "LATROBE" ADJUSTABLE WATER-TIGHT FLOOR BOX

No. 130 Box with No. 207 Bell Nozzle. Cut-away view illustrates how tapered unit receptacle fits tapered opening in adjustable ring. Design eliminates many small parts. Cover plate 3½"—overall height 3½".

There's an
EASIER, BETTER WAY
with FULLMAN

—because Fullman products are designed to take some of the headaches out of wiring. Trouble-free floor boxes and specialties take the gamble out of every wiring job, and assure the profit. Write for catalog.

"Latrobe" FLOOR BOXES
AND WIRING SPECIALTIES

No. 284 DUPLEX RECEPTACLE NOZZLE

With ½" brass pipe extension. Neatest and most compact fitting obtainable. Also available with ¾" pipe extension. Fullman also offers Duplex Telephone Nozzles.

FULLMAN MFG. CO. LATROBE PENN.

CONTRACTORS

Send your splicers to the job with

WATERBURY
UNIT PACKAGE SPLICES

and save money!

This sealed package contains all of the material and the correct quantity of each, for making a complete cable joint, either overhead or underground.

One purchase from one source instead of many from various sources—no waste of material—no waiting to assemble from delayed deliveries. Time out on the job for forgotten material is eliminated.

Your cost is known—not estimated.

Ask your nearest Graybar Branch or write to us direct.

Only tested and approved materials used

Distributed by Graybar

Waterbury Cable Service, Inc.
253 Classon Ave., Brooklyn, N. Y.

STEP-UP QUALITY OF WIRING JOBS!
REDUCE COSTS!

IDEAL SOLDERLESS TAPELESS WIRE CONNECTORS

Wire joints that pass inspection quickly and easily—and at the same time reduce your wiring material costs!

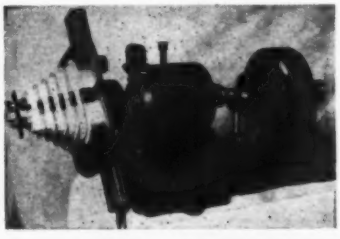
NO HEAT REQUIRED—NO FIRE HAZARD!

Makes joints quickly, easily and conveniently. More permanent and much safer than out-dated solder-and-tape joints.

Better electrically—stronger mechanically. Has greater conductivity than solder and tape joints, greater conductivity than the wires it joins!

Fully approved. Listed by Underwriters' Laboratories.

Free Samples Upon Request



Ideal Coil Winding Head and Drive

Makes popular sized coils in less time!

Heads quickly adjustable to any length or width. Eliminates soldering end of each coil. Takes the place of a multitude of make-shift forms.

IDEAL COMMUTATOR DRESSER COMPANY
1041 PARK AVENUE — SYCAMORE, ILLINOIS

Radio Minded

Every office suite in the recently enlarged 6-story Professional Arts building at Hagerstown, Md. has a radio outlet. There are two master antennas on the roof which serve 51 outlets. At each outlet is an antenna coupler connected to a concealed twisted down-lead system. Wiring by Leonard Ramacciotti, of The Lamp Shoppe.

HEADS BOSTON LEAGUE—Joseph L. Winn, head of the Winn Electric Company, Cambridge, Mass., and past president of the Massachusetts State Association of Master Electricians, has been elected president of the Metropolitan Electrical League of Boston.

Winding Records

Beginning years ago to record complete winding data covering various types of motors and generators, the Chattanooga (Tenn.) Armature Works records take care of coil designs for nearly any machine that might be brought in. Rather than provide separate card records employing symbols, this company's records consist of inked drawings and detailed specifications bound in durable book form.

Shop Test

To test small motors under conditions like they must meet in service, the Reserve Electric Co. of Cleveland connects them up to drive a small compressor. This machine may be loaded for various capacities, and a motor-driven contact-making device provides for continuous starting and stopping.

THE BOTTOMS ARE ------- **FLAT** AS A **PANCAKE**

THAT'S WHY
CONTRACTORS LIKE TO USE THEM

Contractors know that Killark Fittings are easy to handle and to install—that they lie flat and stay put. Therefore, contractors find these fittings right in every sense of the word. Dependable to use and in use, lightweight and strong. They eliminate a lot of worry and bother. Contractors are money ahead after each installation. A complete line of more than 1200 sizes and types. Get the catalog.

KILLARK ELEC. MFG. CO.
3940 EASTON AVENUE, ST. LOUIS, MO.

CONTRACTORS SAY THE KILLARK LINE IS OK

K
KILLARK
ST. LOUIS

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Tile Troubles

In wiring a new fire department headquarters building the Vanderlinde Electric Corp., of Rochester, N. Y., recently had a tedious job of routing conduits in grooves. Hollow tile floor construction was employed but without a concrete floor fill above. To avoid weakening the tiles it was necessary to route ¾-in conduits on the wood form, for concealment in the grooves or seams of the under side of the rows of tile.

DE LUXE JOB—Hagerstown, Md. will soon have a modern six story Professional Arts Building, for which Leonard J. Ramaciotti, youthful proprietor of The Lamp Shoppe made the layout and is doing the wiring and air conditioning. Each doctor's suite has one or more radio outlets, a door operated electric chime, and other electrical conveniences. A mercury vapor lighting system was provided in the basement headquarters of a fruit dealers organization, to provide for better color discrimination.

Motor King

Though beset with shop competition from nearby Philadelphia, George McHugh has made the McHugh Electric Co., of Wilmington, Del., a success by his manner of serving local motor aches and pains. It takes more than thirty people to keep up with the flow of orders. Nuff said!

Jerry Schools

About 110 Indiana boys have received six lessons in the art of farm wiring from a co-op appointee. They are reported to be now wiring farmsteads at 45c. per hour. The instructor, who is officially rated a deputy fire marshal, inspects the work of his overnight proteges. One Indiana contractor claims he is getting follow-up calls to repair plaster, replace broken baseboards, and do other finishing-up jobs.

Alma Mater

Contractors centered among industrial plants experienced serious losses of trained men during depression days. Harry A. Hynes, a veteran contractor of Chester, Pa., can name eight or more of his former ace mechanics who landed good plant electrician jobs when his work slowed down. Now Hynes is faced with better business, and must train his men anew.

Inspections That Pay

When Martin C. O'Rourke had slack periods in his city inspection routine, he scouted around the public schools in Waterbury, Conn., to see how safe their wiring systems were. His findings and recommendations caused extensive school modernization work being authorized, which involved 1600 new lighting fixtures, new services, and other important wiring changes that amounted to about $40,000.

Trade Tricks

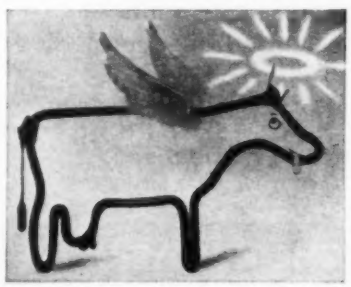
Every community has its acknowledged experts. In Quebec, members of the electrical contracting trade point to A. F. T. Harrower as the wizard of the silver soldering art. So to this contractor's shop at 4 des Ursulines, there are brought fine surgical instruments and other delicate metal parts that need expert mending.

Cottage Cookers

When the Maine Summer Colony moves up North, the L. W. Cleveland Co. of Portland is prepared for light housekeepers in its large merchandising quarters. One large display counter holds among other things some fifteen electric table stoves and cookers. And with ten or more wiremen always on the job, no one need wait long for his wiring job to be started.

Crackers Galore

The return of beer also boomed crackers and pretzels, which in turn brings the Utilities Engineering Co. of Philadelphia into the story. A new 1002-ft. by 160-ft. plant is going up with everything electrical for baking these beer-sipping accessories. And U. E. Co. will take care of every detail for about $80,000.



THAT SACRED COW — Keep your eye on her, when figuring branch circuits.

Turning Tides

After the "shopping" era of the depression come better days. Edward R. Hamilton of Wilmington, Del., has been getting open orders to wire new homes. "Just come and do our jobs and treat us right"—they say. It is a far cry from other days, says Hamilton.

MODERN LIGHTING SPECIALIST *—H. F. Hartman of Scranton, Pa., has recently completed several church lighting jobs where antiquated fixtures were replaced with modern indirect units. Adapting modern lighting to churches, auditoriums, and similar structures requires appreciation of artistic values as well as a sound knowledge of lighting technique. This year the Hartman Electric Construction Company will chalk up its 37th year of electrical service in that area.*

Fact Seeker

William A. Ritt, secretary-manager of the Minnesota Electrical Council wanted to get some facts about the prevailing house wiring costs in his state. So he recently sent out 350 questionnaires. The wide range of prices that were quoted in the first batch of reports causes Ritt to inquire as to who is crazy. Here are a few examples of prices for roughing in outlets:—

Knob-and-Tube, new work 65¢ to $1.75 per outlet, old work $1.25 to $5.00 per outlet.

Non-Metallic Cable, new work, 80¢ to $2.25 per outlet, old work $1.00 to $3.22 per outlet.

Armored Cable, new work 75¢ to $2.90 per outlet, old work $1.25 to $6.00 per outlet.

Other prices were received by Mr. Ritt covering finish work, and service entrances, with the same wide variations.

Short Hours

The 40-hour work week is observed in the large service shop of the Charleston, (W.Va.) Electrical Supply Co. as follows: five 7.2-hr. days and four hours on Saturday. Work starts at 8 and stops at 4, with an .8-hr. lunch period.

CONTRACTORS WHO USE

ILLINOIS PORCELAIN

★ CAN INSTALL COMPLETELY INSULATED WIRING SYSTEMS
★ SECURELY ESTABLISH THEMSELVES WITH THEIR CUSTOMERS
★ MAKE EACH JOB A TRULY QUALITY ONE
★ BUILD THEIR BUSINESS AND INCREASE THEIR PROFITS
★ ARE ABLE TO MEET EVERY REQUIREMENT MOST MODERNLY

NEW — STRONG — WEATHER-RESISTING — WILL NOT RUST — WILL NOT WEAR OUT

A 30 amp. 125 volt Fused Entrance Switch with Illinois all porcelain box. Opening the cover breaks the circuit. Fuses are on the cover, easily accessible and away from all live parts when the box is open.

SWITCH BOXES

Insures greater safety in wiring and the elimination of all grounding hazards.
Made of the best quality of white porcelain. Metal inserts are placed in two holes of the switch boxes for receiving screws of standard switches, plug outlets, etc. Knockouts for single wires, also for cables. Specify and use them.

STANDARD TUBES

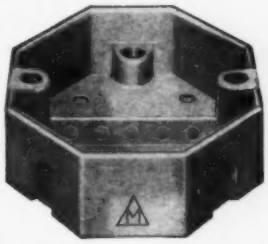
Used by many Contractors because of Dependable Quality

This is an opportunity for Contractors to install completely insulated wiring systems of porcelain, which are safe, economical, efficient, and easy to install. Illinois Porcelain has made this system available for residential and farm wiring where permanency and utmost safety are of prime importance. In addition they are especially suitable for industrial installations, warehouses, cold storage and packing plants, dairies, chemical works, ice plants, breweries, or any place where dampness and fire hazards are prevalent. The use of this system renders grounding unnecessary and makes possible a safe and economical wiring system that lasts indefinitely.

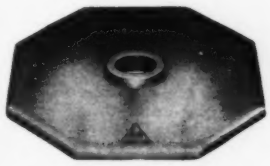
Send for new Bulletin—

It features Illinois All-Porcelain boxes, covers, receptacles, service entrance switches, tubes, and knobs—all free from breakdown due to rusting or corrosion of metal.

In sizes ½ to 48 inches long, 5/16 to 3 inch diameter in following types; unglazed, glazed, split, floor, split floor, headless, curved end, crossover split, and crossover. Diameters all uniform both inside and outside.



OUTLET BOXES



Glazed and unglazed styles conforming to all existing standards of dimensions, spacing, position of knockout holes, and mounting screws. High mechanical and electrical efficiency.

KNOBS

Cement coated — extra length nail — genuine leather washer — code standard. They don't chip when driven in and they do stay in place and have a firm grip. Available in a wide variety of heights, diameters, holes, and grooves.

Profit by using

ILLINOIS AS YOUR SOURCE OF SUPPLY

ILLINOIS ELECTRIC PORCELAIN CO.
MACOMB, ILLINOIS

to Standardize on

ILLINOIS

is a Progressive Step

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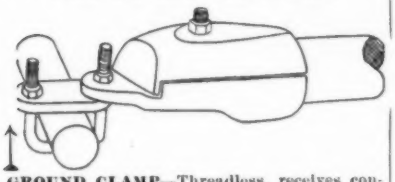
A contractor's man, Teddy Grench
Pinned his hopes and his faith on a wrench.
He worked with a Tapit
Both neatly and rapid
And avoided that "soldering stench."

BURNDY TAPIT — type PG — for making tapeless, solderless cable joints in limited space. Just strip the insulation, tighten the two Everdur cap screws and the connection is made! Furnished in 5 sizes for all combinations of wire and cable up to 1000 Mcm.

BURNDY

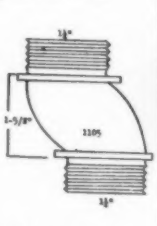
ENGINEERING COMPANY, INC. • 459 E. 133d ST., NEW YORK, N.Y.

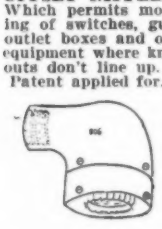
★ *The* HARTMAN *Line* ★



GROUND CLAMP—Threadless, receives conduit at any angle. For rigid or thin-wall conduit. U-bolts from 1¼ in. to 6 in.

OFFSET NIPPLE — Which permits mounting of switches, gutter outlet boxes and other equipment where knockouts don't line up. Patent applied for.





WEATHER PROOF SOCKETS — Built to hold heavy reflectors at any angle. Neat in appearance. Easy to install.

For information see your jobber or write direct.

B. HARTMAN

168 Sunset Street Long Beach, Calif.

K&H

Solderless Terminal

LUGS

and Connectors

Cat. No. 400T

TAP or TERMINAL CONNECTOR

For use in connecting terminals varying in size such as a No. 6 on one side and a No. 00 on the other, or two wires of the same size, with firm contact to both.

• **A connector for any job**
WRITE FOR COMPLETE CATALOG

• **A live wire is no better than its connections.**

KRUEGER & HUDEPOHL

232-8 Vine Street, Cincinnati, Ohio

Trouble Above

It pays to be on hand when heavy signs are being erected over busy sidewalks, just for the moral effect on workmen who might become careless of pedestrian safety, in the opinion of D. J. Thompson, Thompson Electrical Co., Raleigh, N. C.

CANADIAN SPECIALIST — Since 1893 the Thomson Electrical World. Ltd., of Montreal has been building new motors and serving Canadian industries and utilities on rewinding their large equipment. Today this company's large plant is humming along in charge of Clarence Thomson, son of the founder, Fred Thomson. Special attention is given to replacement motors for customer breakdowns, to eliminate shutdowns of important machines.

Plenty Foot Candles

In putting in one of Buffalo's most complete store lighting installations recently, the Robertson Electric Construction Co. reported readings of 75 f.c. Flush show window reflectors came so close together that the edges of retaining collars had to be ground out, in several instances to get 300-watt units in place on 15-in. centers.

Two-Phase Hazard

Up in Hartford, where considerable two-phase power is used, there is difficulty in getting motors designed for use in explosive areas. So, according to John Teufel, approved three-phase motors are installed in connection with banks of Scott-connected power transformers, and all is well.

Send for this NEW DATA

This recent literature, issued by leading electrical manufacturers, has been listed by number for your convenience. Please check on the post card any of this material you would like to receive. It will come to you without cost or obligation.

LIGHTING FIXTURE

1. Descriptive sheet covering the Optilux line of totally enclosed indirect lighting units for 200 to 1000 watt lamps. Edwin F. Guth Company.

SWITCHBOARDS

2. Bulletin GEA-2617 outlining safety enclosed air circuit breaker switchboards with trip-free air circuit breakers rated 250 volts d.c., 600 volts a.c., up to 10,000 amperes, manually or electrically operated. General Electric Company.

FIRE-ALARM SYSTEM

3. A 24-page booklet entitled "Life Hazards" giving statistics on fires in schools, hospitals and sanitariums, hotels, theatres, churches. Illustrates and describes the Dualarm system, including specifications and layouts. The Gamewell Company.

REFLECTOLUX SR. LUMINAIRES

4. A catalog section describing construction features and applications of Reflectolux Sr. luminaires for street lighting. Dimension outlines and light distribution curves included. Section No. 50-058. Westinghouse Electric & Manufacturing Co.

LIGHTNING PROTECTION

5. Bulletin No. 391 covers information in connection with lightning protection for rural distribution lines. Includes pictures of rural installations and pole mounting. Also pictures of equipment and general construction information. Electric Service Supplies Co.

ANTI-VIBRATION PRODUCTS

6. A 16-page booklet entitled "Eliminating Vibration Losses," describes the elimination of machinery vibrations by the application of anti-vibration products to the operating machines. Includes many pictures. Korfund Company, Inc.

CUTOUTS AND FUSE BLOCKS

7. Bulletin C lists cartridge type porcelain cutouts, slate base fuse blocks and special branch circuit panels. For convenience in selecting cabinet sizes, the dimensions of all cutouts, fuse blocks and panels are given. Kolton Electric Manufacturing Co.

RHEOSTATS

8. Bulletin 1515 describes "Jagabi" rheostats for fine adjustment and control of electric current. Standardized ratings are also listed. James G. Biddle Co.

OUTDOOR SWITCH

9. Bulletin GEA-2023A covering a moderate-duty, moderately priced outdoor group-operated switch, Type TC. General Electric Company.

COLOR MATCHING

10. A hand-book on color matching in porcelain enameling plants, includes a description of methods and formulae for forty different colors in general use, a chart showing actual colors of basic oxide and many colors which can be produced by blending them as well as instruction for mixing. Porcelain Enamel and Manufacturing Co.

LUMINAIRES

11. Handbook "J" features five types of indirect lighting equipment. Illustrations and descriptions include indirect urns, appliques, indirect units for use in offices, stores, schools, small shops and restaurants, indirect-direct luminaires for use in merchandising. More than 100 illustrations of various styles and installations. Curtis Lighting, Inc.

SHOP TOOLS

12. A catalog describing electrical repair shop tools. Includes hydraulic pinion puller, armature machine, wire tension machine, slotting saws, coil winding tools, insulation shears, armature winding stands, grinders. Electric Service Supplies Co.

TI LUMINAIRES

13. Catalog Section 61-252 outlines TI luminaires for totally indirect lighting of all general commercial applications. Includes construction, application and lighting intensities for varying mounting heights and spacings for these units. Westinghouse Electric & Manufacturing Co.

WELDED PIPING SYSTEMS

14. A 12-page booklet illustrates and describes the advantages of welded joints in installing piping systems. Subjects of particular interest are pipe and services to be welded, lighter than standard weight pipe, fast, economical welding methods, layouts, drawings and specifications, welded joints and fittings, plan of construction, shop and field fabrication and piping erection. Linde Air Products Co.

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30th Floor New York, N. Y.

UMI

DISC PRESSURE FANS

15. Bulletin E, the "Selective Series" of disc pressure fans designed for diverse specific capacity requirements. Includes performance tables, engineering data and illustrations. DeBothezat Ventilating Equipment Division, American Machines and Metals, Inc.

MERCURY CONTACTS

16. Catalog No. 371-M illustrating and describing a line of ferrotube mercury contacts. Includes specifications and prices. Jefferson Electric Co.

LIGHTING EQUIPMENT

17. A 12-page catalog describing Sight-Craft lighting equipment for use in offices, stores and schools. Many illustrations and installation pictures. Smoot-Holman Company.

EMERGENCY LIGHTING SYSTEM

18. A folder describing the Exide Keepalite emergency lighting unit for use in hospitals. Includes pictures and hospital layouts. Electric Storage Battery Co.

BUILT-TOGETHER PUMP

19. Bulletin 5592 presents the two-stage built-together pump designed for operating at high speeds against heads up to 475 feet. Includes photographs, diagrams, application, sizes and dimensions. Fairbanks, Morse & Co.

NEON TRANSFORMER

20. Bulletin 143 describes the Autopak, a neon transformer to illuminate neon signs and displays installed in automobiles. Acme Electric & Mfg. Co.

VOLTAGE SWITCH

21. A folder outlining the super-sensitive line voltage switch with "1001 applications." Typical uses are limit switch, counting devices, safety switch, time delay mechanisms, circuit breakers, liquid level controls, gauging devices, relays, pressure controls, governors. National Acme Company.

INSULATING VARNISHES

22. A 32-page catalog covering insulating varnishes and compounds. Data on baking varnishes, air drying varnishes, finishing varnishes and compounds. Many illustrations. John C. Dolph Company.

PYRANOL CAPACITORS

23. A folder featuring small pyranol capacitors for motors and other equipment. Type CE-continuous rated is illustrated with details on design, application, dimensions and ratings. Bulletin GEA-2027-A. General Electric Company.

SPEED REDUCER

24. Catalog No. 101 features a new line of miter gear units. Motor-driven speed reducers and mechanical reducers, as well as a line of flexible couplings. Contains 98 pages, pocket size. Boston Gear Works.

ELECTRODES FOR WELDING

25. Catalog section 26-640 covers crucible weld electrodes for a.c. welding. Describes three grades and sizes available and their application to all types of a.c. welding. Westinghouse Electric and Manufacturing Co.

INSULATING MATERIALS

26. A guide book of pocket size, consisting of 40 pages on electrical insulating materials, such as insulating papers, asbestos sleeving and tape, cotton tapes, webbings, twines, flexible varnished tubing, transformer compounds, cable filling and pothead compounds, mica tape and tubing, friction tape and splice, cambric tape and others. Mitchell-Rand Insulation Co.

TIME SWITCHES

27. A catalog of Sauter synchronous and electrically wound time switches. Embraces types for every time switch application. R. W. Cramer & Company.

OSCILLOGRAPH

28. A bulletin illustrating and describing the features of the Du-Mont 5-inch all-purpose oscillograph, Type 168. Includes the sweep-expanding amplifier whereby the wave pattern may be stretched out across the screen for critical study. Allen B. DuMont Laboratories, Inc.

LIGHTING FIXTURES

29. A 16-page catalog describing the larger plastic diffuser bowl, used in LaSalle Wallamps. Many types of Wallamps are illustrated and outlined. LaSalle Lighting Products, Inc.

PHOTOELECTRIC POTENTIOMETER

30. A bulletin covering the operating characteristics and fields of application for the Weston Model 721 photoelectric potentiometer and its related equipment. Weston Electrical Instrument Corp.

FLEXIBLE COUPLINGS

31. A 16-page catalog presenting technical data on many types of flexible couplings. Includes heavy, medium and light duty couplings, also shear pin. Details of drive studs and bushing assemblies and general remarks on torque, horsepower ratings and safety factors. Ajax Flexible Coupling Co.

ELECTRICAL EQUIPMENT

32. A folder illustrating and describing thermo grip pliers, washer punch, wire stripper, floating-carbon pile regulators, electric marker, fish tape reel and puller, fuse clip clamp and armature stand. Ideal Commutator Dresser Co.

CONNECTOR

33. Bulletin No. 4087 featuring Servlug, a small, handy connector which has unlimited applications. Used with terminal connectors—on safety switches, panel boards, motor leads or junction boxes. Burndy Engineering Company, Inc.

COMPRESSOR UNIT

34. Form 2320-A is a folder describing Model U-85 two-stage, air cooled self contained utility compressor unit. Includes many illustrations and specifications. Ingersoll-Rand Company.

WATER COOLERS

35. A folder describing electric water coolers including self-contained units for floor mounting, "remote" cooling units and special water-cooling equipment. Bulletin GEA-2552. General Electric Company.

LIGHTING UNITS

36. "Red Spot" catalog lists many new lighting units of interest to contractors, architects, electrical dealers and utility men. Includes a line of lighting units with molded Plaskon reflectors from miniature lighting models to large department stores. F. W. Wakefield Brass Co.

Please note that there is a charge for the following pamphlet. Send for it direct to the Association.

CIRCUIT BREAKER STANDARDS

This pamphlet, entitled "NEMA Large Air Circuit Breaker Standards," Publication No. 37-43" concerns the rating, performance and manufacture of large air circuit breakers. This material supersedes that which appeared in "NEMA Switchgear Standards," Publication 31-10, which was released in 1931. Contains all ampere ratings, voltage ratings, mounting, definitions, etc., that have been set up by the Association. Price 75 cents a copy. National Electrical Manufacturers Association, 155 East 44th Street, New York, N. Y.

CIRCLE NUMBERS-SIGN-AND MAIL

ELECTRICAL CONTRACTING — **October**
(Not good after January 1)

Please send me, without obligation, manufacturers' literature herein described and identified by numbers circled below.

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18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
33 34 35 36

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About NECA

CONVENTION TRAIN SOLD OUT

All available space on the NECA Convention Tour special train has been completely sold out. Last minute reservations can only be accepted in the event that there is a cancellation of present reservations.

The NECA Train will consist of 14 cars, solid compartments and drawing rooms. Ample space for social activities will be provided by a commodious club car at the head of the train, a lounge car in the center and an observation car at the rear. The train will carry two diners throughout the trip of 20 days to Los Angeles and return with stop overs at many interesting points.

Three of the Pullman cars will start from Atlanta, carrying the members of the Southeastern Industrial Chapter and of the Atlanta Chapter. They will be attached to the Convention Special at Chicago. The Chicago Chapter delegation will fill three Pullman cars and the New York delegation will require two cars.

Visits to Coast Cities

Following the four-day National Convention at Los Angeles, the Convention Tour party of nearly 150 members will go north to San Francisco, Portland and Seattle. At each of these cities, plans have been made by the local NECA Chapters to entertain the visiting delegates from the East.

At San Francisco on Sunday, October 24th, the Tour party will be taken for a 4-hour auto trip across the great San Francisco Bay bridges and through the surrounding Bay region. On the following night an industry dinner will be held at the famous Bal Tabarin Cafe in honor of the eastern visitors.

Proceeding north, the next stop of the Tour party will be at Portland, Oregon, where plans have been made to take the entire party for an 80-mile trip up the Columbia River Highway to Bonneville Dam. That evening the travellers will be as guests of the Portland Chapter, NECA, at an industry banquet at the Hotel Multnomah.

The final stop on the 20-day tour will be at Seattle on Thursday, October 28th, where the Tour party will be guests for the entire day of the Seattle Chapter. An interesting program of sightseeing and entertainment will conclude with an industry dinner at the Olympic Hotel in the evening. The Tour train is to be back at Chicago on Sunday morning, October 31st.

THE STORY OF NECA MEMBERSHIP

NECA is extending an invitation to a carefully selected list of 5,000 electrical contractors to become members. This invitation to membership presents a list of "business tools" as valuable to any contractor as his license, office, machinery or trucks.

So at this convention time, when every member is turning his mind to the national affairs in the electrical industry, it has been suggested that this list of services that membership in NECA brings, be set down here. It is worth a review by members as well as those who do not yet belong and benefit.

NECA Manual of Labor Units

The first and most important tool in every electrical contractor's office, no matter what size the business, is a dependable estimating manual. The NECA Manual of Labor Units, issued just a year ago, contains the combined and tested experience of thousands of electrical contractors. The Manual is made up in 8"x10" loose-leaf sheets in a leather binder with quick-reference index tabs, and presents the labor units in a clear, concise manner so that the estimator can see at a glance what unit to apply and where. All units are in man-hours, so that the estimator has only to apply the units to the quantity of material, multiply by his labor rate and have the proper answer to his labor costs. The guess is taken out of estimating.

The NECA Manual of Labor Units, together with the monthly service of new data sheets for the Manual, is furnished to every NECA member. With the Manual is also supplied the Electragists' Estimating Textbook of 188 pages covering all phases of procedure in sound estimating.

Estimating Forms

Carefully designed forms for every phase of the contractor's business are available to NECA members at low cost prices, made possible by the printing and stocking of such forms in great quantities. For the estimator using the NECA Manual there are five forms, as follows:

Branch Circuit Schedule
Feeder Schedule
Conduit and Wire Summary
Pricing Sheet
Recapitulation Sheet.

The Recapitulation Sheet brings together all of the estimated cost of material and labor and provides for the addition of items of non-productive labor and all job expenses. To the resulting total prime cost it is only necessary to add proper overhead and profit to arrive at the correct selling price.

Job Record Forms

NECA members make use of large quantities of the many special forms designed for job records. Some of the forms in most demand are the Daily Time and Work Reports, Requisition for Materials, and Returned Material Records.

The Uniform Proposal (Form 40) provides, on the face of it, data for submitting to the customer a complete estimate for house wiring and small commercial work. Important "Conditions of Contract" are printed on the back of the form for the contractor's protection.

***BUSINESS TOOLS**—NECA members receive this array of practical services that all help build profits.*

UNIVERSALLY
USED
UNIVERSALLY
OBTAINABLE

RAWL-DRIVES

A drive anchor entirely NEW in principle. Drives like a nail, holds like a bolt. The only expansion bolt that combines the bolt and anchor in ONE PIECE.

Write for Catalog 37 C

THE RAWLPLUG CO., INC.
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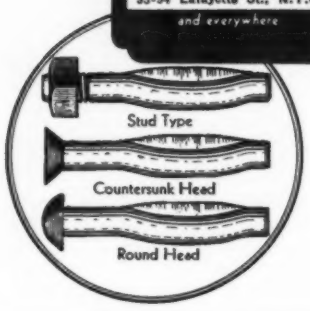
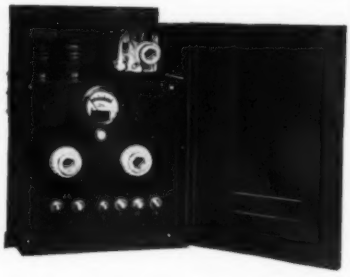
and everywhere





Replace troublesome batteries
with a
TELENCO ELIMINATOR

Use it for telephone systems, intercommunicating phones, dial systems, relays and other devices that require a low voltage, pure direct current.

- No chemicals or moving parts.
- Even "hum-free" direct current.
- Special voltage control feature.

Write for Bulletin BET-101

TELENCO-ELECTRICOIL CO.
287 BROADWAY, NEW YORK, N. Y.

About NECA

[FROM PAGE 167]

Accounting

The Simplified Business Record System for Electrical Contractors, designed by NECA two years ago, has proven the most effective accounting system for electrical contractors doing an annual business under $75,000. This simple system can be kept with minimum bookkeeping effort and does not require knowledge of complicated accounting principles to operate. The Simplified Business Record System is not sold but is furnished without cost to each member of NECA, upon request.

For larger concerns doing business over $75,000 and maintaining an Accounting Department, the Standard Accounting System provides the most complete method for recording the contractor's business. A Manual of Accounting Practice, describing all of the accounting principles, is furnished to members purchasing the Standard Accounting System.

Handbook of Interior Wiring Design

In the coming national program for adequate wiring, the standards in the Handbook of Interior Wiring Design, as prepared by the Joint Industry Committee, will be made the basis for adequate wiring promotion. This Handbook of Interior Wiring Design is furnished to every NECA member without cost. The price of the Handbook if purchased by non-members from the Joint Industry Committee is $1.00 per copy.

Survey of Wage Rates

Every electrical contractor is called upon to figure jobs from time to time outside of his own city. Each member of NECA receives a copy of the NECA Survey of Wage Rates, a 20-page booklet containing annual survey of open shop and union shop wage rates in nearly 1000 cities throughout the country.

Special Services

Members of NECA receive the latest information on all subjects affecting their business interests. There has just been sent out to NECA members, without charge, a complete Analysis of the 1937 Revision of the National Electrical Code. Special printings of the 1937 Code have been made up on large pages for the use of local Code Committees.

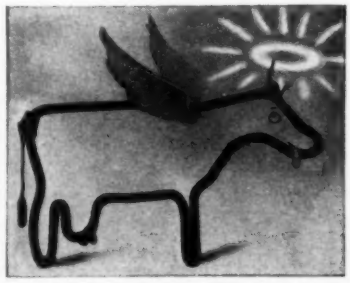
Drafts of model licensing and inspection ordinances and model state electrical laws are available through NECA membership. Statistics on overhead are compiled by NECA for the guidance of its members. Many other advisory services are available to NECA members for the asking.

Monthly Bulletin and Magazine

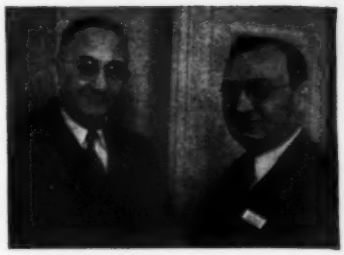
The NECA monthly bulletin, "The Qualified Contractor," brings to each NECA member, every month, important information covering the activities of his National Association, Federal and State legislation affecting the electrical contractor and other current news of importance to his business. Subscription to the "Electrical Contracting" Magazine is included as a part of NECA membership and provides a further source of indispensable information.

The Qualified Contractor

The electrical contractor who is a member of NECA is a *qualified* electrical contractor. He is qualified to give better service, to do more work and do it more quickly, more efficiently, more effectively and more profitably because of the business tools he receives through his membership. The term "Qualified Electrical Contractor" identifies a NECA member.

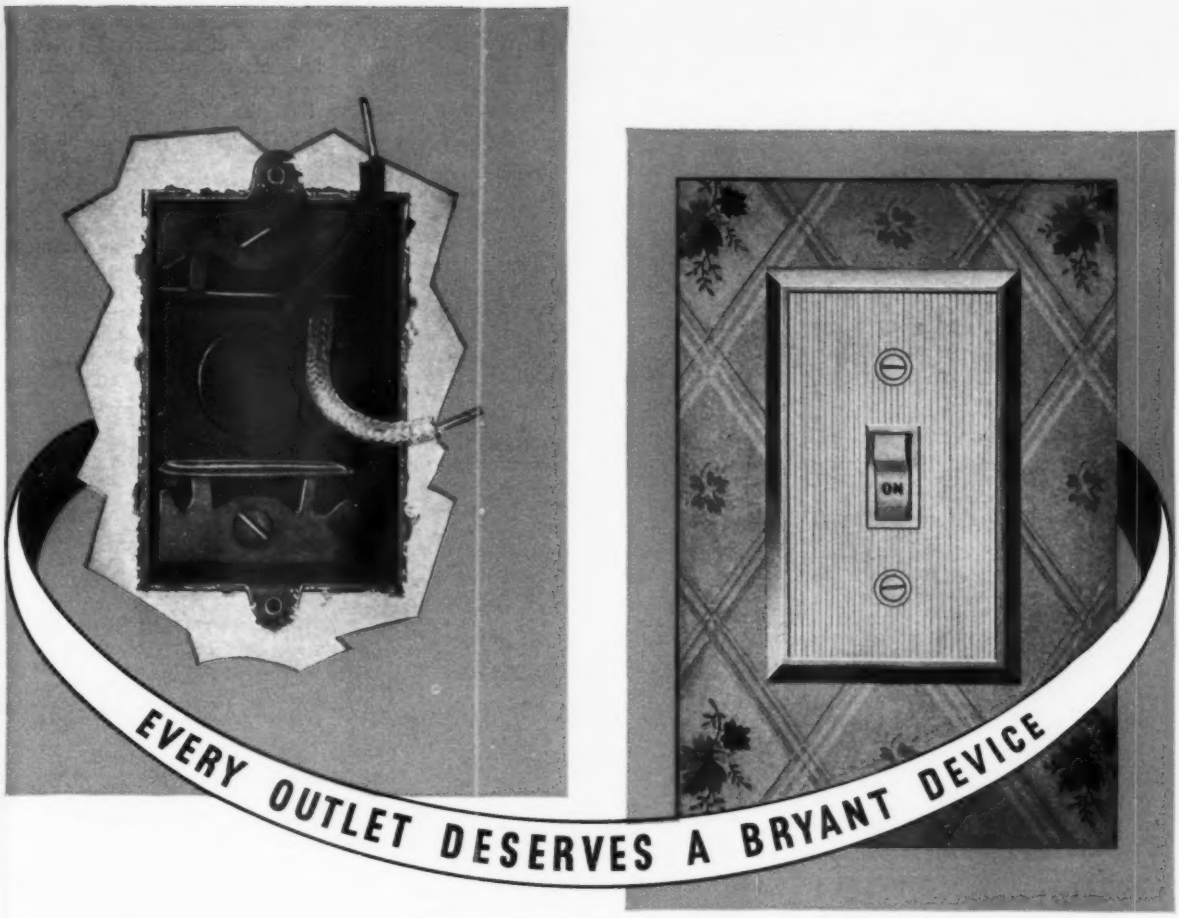


THAT SACRED COW—Is old No. 14 still fooling you on branch circuits?



DUAL PURPOSES — Chicago's motor shop operators are banded together fifty strong in a 17 year-old association, of which Roy F. Hyre (right) of the Hyre Electric Company is its proud and hard-working president. When Roy induced J. Walter Collins, secretary of the Chicago Electrical Contractors Association to peek in at the NISA Convention, our candid camera caught the pair of them looking happy over the turnout. Roy's pet association slogan, by the way, is: "What are you doing for your fellow member?"

Material for this department is supplied by the headquarters staff of the National Electrical Contractors Association, 420 Lexington Avenue, New York.



ATTRACTIVENESS — the Finishing Touch

Your customers can't look inside the walls to see the good wiring jobs you've done. But they do see the wiring devices with which you *finish* your work. And they appreciate attractiveness.

The design and finish of all Bryant and Hemco devices add beauty to quality—*economically*. Bryant Ivory devices, smart and attractive, will harmonize with furnishings or decorative schemes. To show them is to sell them.

There's a wiring device for every need in the new Bryant easy-to-use catalog.

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Paste
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Friction Tape
Waste Time
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Acid or Torch

The MARR
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(CAP MADE OF BAKELITE)

Only a
Screw Driver and
20 Seconds' Time!

PROVE IT—FREE

Just twist or place the wires together in connector and set down the screw. Slip over the Bakelite cap, screw up, and the job's done in 20 seconds!

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"DM" Megohmer

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Elect. Contr. 10-37

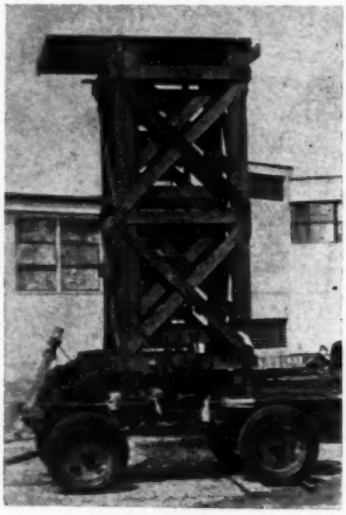
Two Big Bridge Jobs

[FROM PAGE 11]

erect and maintain a lighthouse, and an aid-to-navigation light on the pier head of the bridge structure.

The engineers for this bridge, prepared the plans and specifications but left the engineering details of the installation to the contractor. Therefore, much of the electrical design had to be worked out by Mr. Bennett. One of the prime requisites of the electrical installation here was absolute reliabilty of electric service to operate the fog horns and the navigation lights. Accordingly emergency sources of power are numerous.

The primary source is 11,000 volts, supplied from two separate points by the Pacific Gas and Electric Company, to separate banks of 300 kva., 11,000/2300 volts, 3-phase transformers located in the Toll Plaza transformer room. Pyranol filled transformers were used to reduce fire hazard and enable the vault to be placed directly in back



MOBILE TOWER—*Trailer-type towers with hand winched platforms worked out efficiently for doing high-up assembly and connection jobs on the Oakland Bridge.*

of the switchboard room. Should the central station power fail, the first emergency source is a 187½ kw. gas engine driven set, which after time delay, picks up the cable outline lights, the mid span and fender lights, the airway beacon, the service elevators in the towers, the lighting around the pylons and towers and eight Mazda lighted standards at the Toll Plaza and the lighting in the collection booths. The final emergency source of power is a storage battery which ordinarily supplies relays with d.c., and is used to crank the engine, but in extreme cases can keep 300 watt lamps burning over the collectors and maintain other emergency lighting.

The Golden Gate Bridge is lighted by 10,000 lumen sodium vapor lamps in Alzac aluminum reflectors. There are 102 luminaires on the bridge itself, 67 units on the approaches and 15 in the tunnel on the Waldo approach on the Marin side of the bay. Spacing is 150 feet, opposite pairs, with a uniform mounting height of 25 ft. above the roadbed.

Here the contractor designed a unique standard. It was fashioned from a 10-in. steel I-beam, by cutting the webb halfway between the flanges and spreading and shaping it into a jaw to support the sodium luminaires with a conduit strapped into the flange and a base fitted with a removable plate to house the series transformer. These standards were delivered to the bridge, where two wiremen, equipped them with the sodium units. The mounting crew, with the derrick and winch truck, then lifted the luminaire in place over its pull box case in the sidewalk slab. The complete "fixture" was set over the leveling nuts and lugs and bolted tight, then connected to the primary leads from the pull box. Twenty such standards were set per day by the experienced crew.

How Circuits Were Run

On this bridge too, instead of flexible armored cable, regular steel conduit was used as raceways for the lighting and supervisory circuits. Conduits were run from the San Francisco side in a recess in the sidewalk steel beam, encased in concrete. Pull boxes of cast-aluminum were located 135 ft. apart. Conduit sizes were decreased as they neared the Marin approach and a number of circuits were dropped. One set of conduits contained supervisory circuits on navigation equipment, emergency telephones, fog horn control circuits and lighting circuits on the bridge. Another contained 3-phase power circuits to the elevators and to the navigation light transformer vaults.

Brass expansion joints were used every 50 ft. of conduit, held fast to the steel members of the sidewalk by cast-iron screwed fittings at one end and an expanding bronze sleeve and socket at the other. By an ingenious gang arrangement for holding the cable reels, 15 telephone and supervisory system wires were pulled in the conduit at one time. At the expansion joint at each tower was a loop of bronze flexible cable. Splices between the tellarium cables, carrying the current supply, and the flexible cable, were made in junction boxes on each side of the towers. The flexible cable was of bronze and tested for 180 lb. hydrostatic pressure.

As on the San Francisco-Oakland Bridge, tool equipment speeded the work at every opportunity. Also, the Golden Gate Bridge had the benefit of skilled workers who had already gained experience on the San Francisco-Oakland Bay Bridge.

NOFUZE GETS *new* BUSINESS FOR CONTRACTORS *who use it as a Sales Tool!"*

WESTINGHOUSE
ELECTRIC & MANUFACTURING COMPANY
EAST PITTSBURGH, PA.

FETY -- WITH REAL SALES PUNCH

Pittsburgh electrical contractor used Nofuze protection
o sell one of his most profitable maintenance contracts.

His prospect was a big dairy. He used the Nofuze SAFETY
and SAVINGS story to get inside the plant, and made a
thorough check-up of the wiring system.

He proved to them they could save at least $3,000 per year.
Their maintenance costs, due to inadequate circuit protection,
were hitting this high total.

They bought. The dairy manager was enthusiastic over the
savings -- and it wasn't much work to sign him up on a contract
for electrical maintenance of the entire plant.

We believe this can be typical of the business-getting possi-
bilities of Nofuze protection. Contractors who have made the
most of it use the Nofuze Breaker to "get into" industrial
plants -- and to show how they can point out ways to cut costs.

Our Wholesalers have full details and actual examples that
PROVE how Nofuze Breakers save money. If you aren't making
use of this sales builder, why don't you call our man now, and
see for yourself if this story is as good as it sounds.

Sincerely yours,

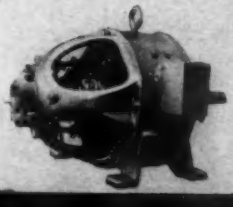
Westinghouse Electric & Mfg Co.

NOFUZE "DE-ION"
CIRCUIT BREAKERS
100% Safety
PLUS
Important Savings

Every House needs Westinghouse

CS (AC) MOTORS for any constant-speed drive—all sizes and types.

"DE-ION" LINESTARTERS — Most important forward step in entire history of motor control equipment.



SAFETY SWITCHES—Every size and type, with exclusive Westinghouse Diamond-pointed jaw and extended blade construction.

FROM INCOMING LINE
TO DRIVEN MACHINE

Install Westinghouse

WITH THE *Manufacturers*

Dongan Appointments

Dongan Electric Manufacturing Co. of Detroit announces the appointment of the following representatives—

R. C. Chelius has been assigned to the western half of New York State, with offices at 31 Palmer Ave., Buffalo, N. Y.

H. H. Van Luven will cover southern California with offices at 308 W. Fourth St., Los Angeles, Calif.

Charles R. Speaker will cover Washington, D. C. and Maryland, working out of his office in the Evening Star Building, Washington.

•

Ideal Commutator Dresser Co. of Sycamore, Ill. has recently enlarged its plant, offices and engineering department, as a result of a general expansion program now in progress.

•

Auburn Automobile Company of Connersville, Ind., has purchased from the Russell Electric Co. the trade name "Aerofan," together with the goodwill and exclusive patent licenses on the fans formerly manufactured by Russell. A complete line of electric fans, air circulators and other units for the movement and control of air in winter and summer will be built at the Auburn air-conditioning plants and merchandised under the "Aerofan" name.

•

Joseph Gardberg has been appointed manager of the new Cutler-Hammer, Inc. office in New Orleans, La., located at 539 Gravier Street.

•

Trico Fuse Mfg. Co. of Milwaukee has appointed the Delavan Engineering Co. as sales representative in the states of Iowa and Nebraska. Its headquarters is 414 12th Street, Des Moines, Iowa.

L. F. A. Mitchell has recently been appointed to head the Construction Industry Section for the Westinghouse Electric & Manufacturing Co. He was formerly assistant manager of sales for the Canadian Westinghouse Co.

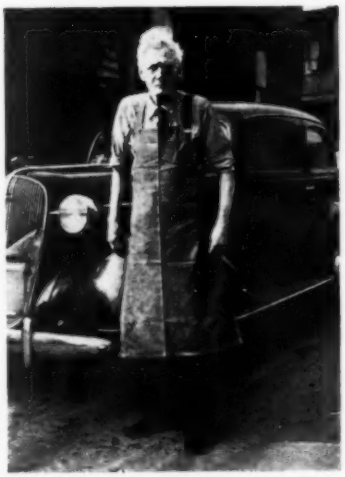
•

Marvin Marsh has been named manager of the new Kansas City office of the American Rolling Mill Company of Middletown, Ohio. He will be located at 7100 Roberts Street.

•

Allen-Bradley Co., Milwaukee has appointed the Wilson Electrical Equipment Company, 2009 Capitol Ave., Houston, Texas, its representative in the southern territory. The Delavan Engineering Company, 414 12th Street, Des Moines, Iowa, has been appointed representative in the Iowa territory.

•



TOGGLE FATHER—Because the doctors told him to, at sixty H. M. Paine quit his job with Hayward-Wakefield after 25 years. Then just to rest and relax in his basement workshop he invented the first toggle bolt and started the Paine Company. For 26 years he has been inventing and manufacturing metal specialties. Now at 86 he is the keenest go getter in the organization and the hardest worker.

Johns-Manville Promotions

Seven promotions, including the election of three new vice presidents of the Johns-Manville Products Corporation, were announced by Lewis H. Brown, president of Johns-Manville Corporation.

The new vice presidents are A. R. Fisher, formerly manager of the company's largest factory at Manville, N. J.; J. P. Kottcamp, manager of the key Mid-Western factory at Waukegan, Ill.; and Alexander Cromwell, currently manager of Pacific Coast manufacturing operations.

J. E. Begert, formerly head of Cost Reduction Department in New York City, has succeeded Mr. Fisher as manager of the Manville plant.

At the Waukegan factory K. W. Huffine, formerly manager of the Alexandria plant, has been named to succeed Mr. Kottcamp as manager.

H. J. O'Brien, formerly superintendent of Rock Wool Department at Manville factory, has become manager of the Alexandria plant.

W. Kelty, who was assistant to Mr. Begert, succeeds him as manager of the Cost Reduction Department.

E. S. Crosby has been appointed president of Johns-Manville International Corp., a subsidiary of the Johns-Manville Corporation. He succeeds Lewis H. Brown. In addition to his new post, Mr. Crosby is also general manager of both Asbestos Fibres Distributors and the Replacement Automotive Products Department, both divisions of the J-M Sales Corporation.

•

Paul Sternberg has been appointed comptroller in charge of the finance and accounting departments of M. H. Rhodes, Inc., Rockefeller Center, New York City.

•

James Hunter has been appointed sales manager of the Buffalo office of the Standard Transformer Co., Warren, Ohio. His headquarters will be at 259 Delaware Ave.

•

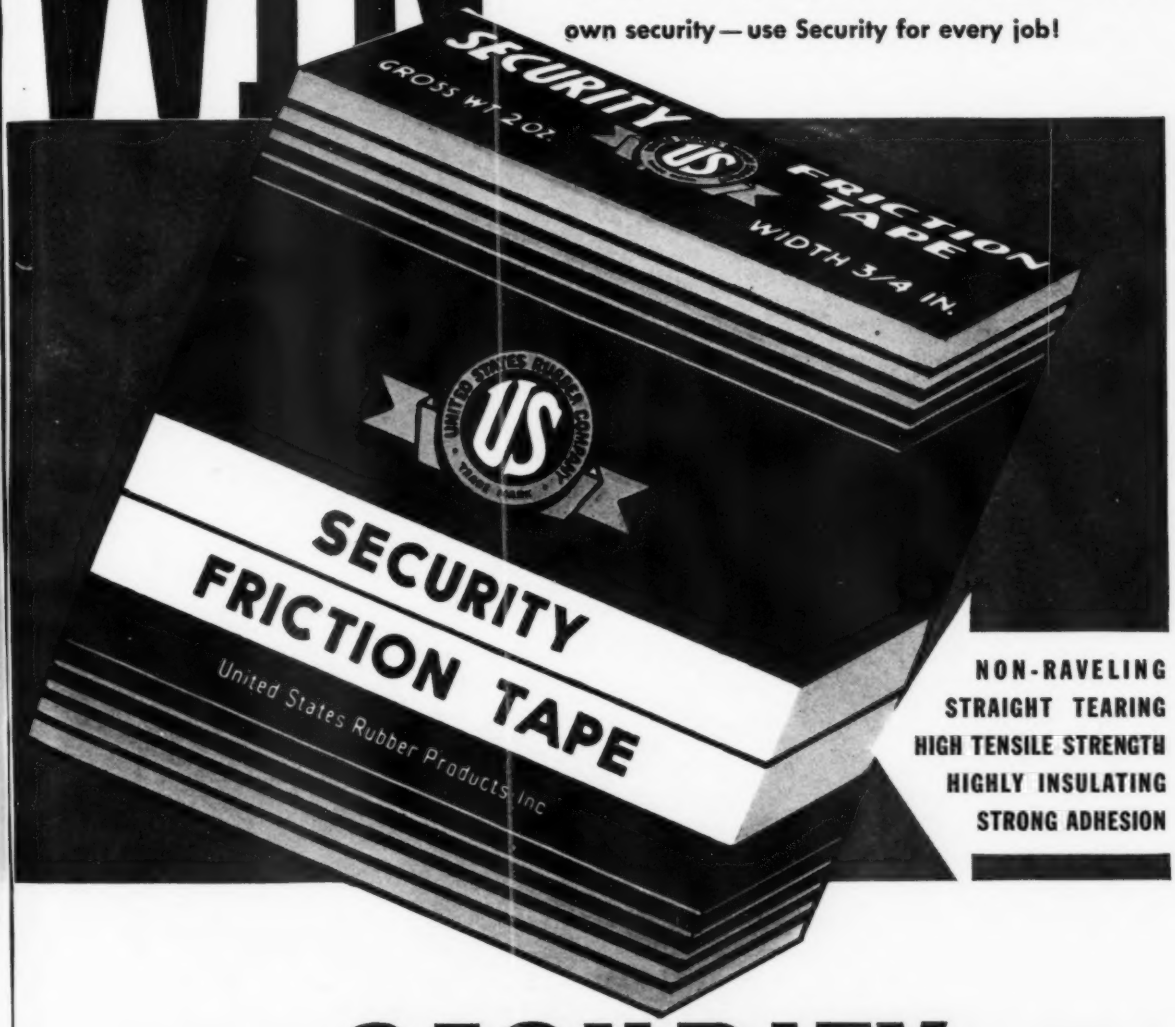
Cohoes Personnel Changes

Charles L. Dunbar, president of the Cohoes Rolling Mill Co., Cohoes, N. Y. announces the following appointments—

A. M. Mosley, vice-president and general manager; M. L. Jacob, assistant general manager; A. Macfadyen, vice-president in charge of purchases; W. S. Crawford, vice-president in charge of credits and accounts; R. C. Poskanzer, treasurer; C. D. Mauchan, assistant treasurer; W. S. Crawford, secretary and John W. Cooper, sales manager.

WIN

job insurance with Security—the quality tape that lives up to its name! Neat, quick, permanent jobs with Security win customer approval, give you a reputation for good jobs that stay good. For your own security—use Security for every job!



NON-RAVELING
STRAIGHT TEARING
HIGH TENSILE STRENGTH
HIGHLY INSULATING
STRONG ADHESION

SECURITY

SECURITY BEYOND PRICE AND SPECIFICATIONS

United States Rubber Company

United States Rubber Products, Inc., 1790 Broadway, New York, N.Y.

UMI

EQUIPMENT News

Electric Spigots

The electric spigot will feed power and light for outdoor uses. It places a weatherproof hood and cover, hinged with heavy spring, over the outlet. Keeps out rain, snow and ice. For installation, drill 1¾-in. hole in wall, pull cable through opening, attach to self-binder for armored or non-metallic cable and secure to wall with two screws. Also can be used inside houses without hood or cover. National Electric Products Corp., Pittsburgh, Pa.

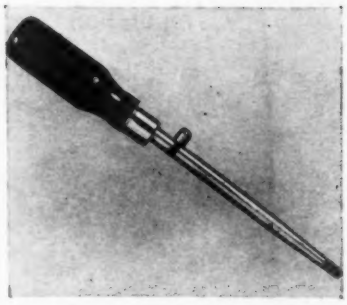
NATIONAL ELECTRIC SPIGOTS

■

Indirect Lighting

Attach-A-Lite is an indirect sight-craft luminaire with luminous bowl. Attaches to any existing lamp cord. Finished in ivory, and all metal and available in two sizes. Recommended for use in kitchens, breakfast rooms, bedrooms, corridors, hotel rooms, dens, allowing advantages of indirect lighting without cost of additional wiring. Smoot-Holman Company, Inglewood, Calif.

SMOOT-HOLMAN ATTACH-A-LITE



STROMBERG GRIP-POINT SCREW DRIVER

Screwdriver

The grip-point screwdriver is designed for use of electricians, mechanics and repairmen in anchoring screws in hard-to-get-at places. The grip-point, when released by a lever, ejects and revolves, gripping the screw-slot firmly. It is operated with one hand. When an ordinary screwdriver is desired, the lever is pushed back into a slot and the grip-point disappears. Stromberg Motoscope Corporation, 2701 Belmont Ave., Chicago, Ill.

■

GENERAL ELECTRIC GLUEPOT

Automatic Gluepot

Quick production of workable glue and careful regulation of glue temperature are features of this automatic gluepot. Designed to heat rapidly until it reaches 140-150 degrees F. Final temperature is factory set and accurately and automatically maintained. Consists of removable copper container for holding glue, heated copper jacket in contact with glue container and outer protective casing of heavy steel. Capacity two quarts, and available in 115- or 230-volts, a.c. or d.c. General Electric Co., Schenectady, N. Y.

BURNDY GUTTER TAP

Gutter Tap

Type QPR gutter tap has been designed to eliminate the need of keeping many sizes of connectors in stock. Constructed in three sections "telescoped" together and held in place by Everdur cap screws. Each tap accommodates a range of conductor sizes with neatness and compactness. May be quickly installed with use of a single wrench and may be easily tapped. Sizes from No. 8 solid up to and including 2,000 MCM. Burndy Engineering Co., Inc., 459 East 133d Street, New York.

■

Mobile Color Lighting

"Color-Blend" machines provide continuous cycles of blended 3-color lighting in total connected a.c. loads ranging up to 20,000 watts. Designed for producing blended mobile color effects in homes, bars, restaurants, night clubs, stages, dancing pavilions, and for window lighting and spectacular outdoor lighting displays.

This device employs a motorized rotating multi-volt transformer principle, rather than resistances. A 33⅓ per cent saving in current consumption is claimed, together with smoothly and automatically blended color effects without stops or flashes between color changes. Changes are timed at the rate of 60 seconds per color, or a 3-minute interval for the complete 3-color cycle. Variable timing rates are also obtainable.

Made in four standard sizes of 750, 1800, 5000 and 10,000 watts capacity for total connected loads of 1500, 3600, 10,000 and 20,000 watts, in types to operate from 110, 220, 1100 or 2200 volts. The Lockwood Electric Co. Cincinnati, Ohio.

LOCKWOOD COLOR BLEND DEVICE

THAT'S ALL THERE IS–

to the construction of a SHUR-LAG RENEWABLE FERRULE TYPE FUSE. But there is a great deal more to a SHUR-LAG, for your benefit and protection, *because* of its construction.

The link is clamped directly to the solid end caps. You can remove or insert the link at either end of the fuse, and there is plenty of room to do it easily. And the link IS OF UNIFORM THICKNESS THROUGHOUT ITS LENGTH. When it blows, you can still remove it easily and instantly.

Minimum number of parts; ruggedest construction; proper time-lag to prevent needless blowing, yet to forestall damage. The utmost in economy, service, and protection — and the price is no higher.

SHAWMUT (S) SHUR-LAG

RENEWABLE FUSES

Approved by Underwriters' Laboratories

The **CHASE-SHAWMUT COMPANY • NEWBURYPORT • MASSACHUSETTS**

Fuse makers since 1893

The easiest way to get ahead in electricity—

through the other man's experience as found in books

Whatever "getting ahead" means to you as an individual, there is no principle so important as backing up your brain with the other man's experience. Why spend time and effort to find out what has already been learned and put down for all to see in books? Here, for instance, are all the results of a rich experience in every stage of wiring, installation and contracting work gathered and set down for you in

Terrell Croft's

AMERICAN ELECTRICIANS' LIBRARY

(6 volumes—over 2,000 pages—fully illustrated)

In six really magnificent volumes this library gives the most thorough, most complete and easiest-to-understand treatment of the more specialized phases of electrical practice in print today.

"How" and "why" for Maintenance Men

The books show the best ways to make installations for every type of conduit wiring job—they tell how to handle every kind of lighting and switch problem—they give tips on short-cuts for saving time on routine jobs—they show the quickest and surest methods of locating and remedying circuit troubles. Alternating current armature winding, electrical machinery control diagrams and machinery erection are some of the things covered in detail.

Diagrams

In all, these books contain more than 1,000 clear, easy to follow diagrams, with wiring instructions written in simple language. It is unnecessary to tell you how valuable is this one feature alone.

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You may examine these books free for 10 days by sending the coupon below, filled out. In addition, if you decide to keep the books you have the privilege of paying for them in easy monthly installments while you use the books. Make sure you are not passing up your best bet for getting ahead. Mail the coupon today

FREE EXAMINATION COUPON

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330 W. 42nd St., New York, N. Y.

Send me Croft's American Electricians' Library, 6 volumes, for 10 days' free examination. If I find the books satisfactory, I will send you $1.50 in 10 days and $2.00 a month until $17.50 has been paid. Otherwise I will return the books postpaid.

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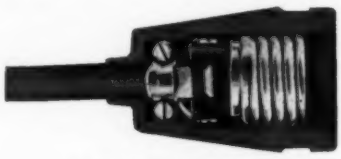
(Books sent on approval in U. S. and Canada only.)

EQUIPMENT News

[FROM PAGE 174]

Rubber Socket

No. 4 C & E rubber socket is adapted for drop cords and recommended for use in damp places. It is weatherproof and shockproof. Insert socket has a special cord grip clamp so that no tensions can come on connection. Fits both Junior and Type S rubber covered cord and connects as easy as a brass socket. Ericson Manufacturing Co., Cleveland, Ohio.



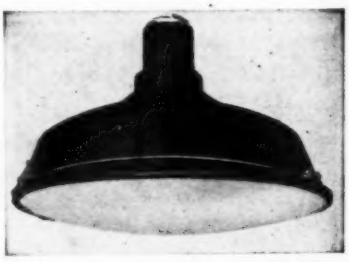
ERICSON RUBBER SOCKET

■

Hard Service Cords

"Tricord" all rubber hard service cords and cables with 60 per cent rubber jacket, for use where current supply extensions are necessary to connect portable tools, appliances and machines. Gives extra protection against abrasions and abuse where heavy duty is entailed. Designed for industrials, mills and mines. Triangle Conduit & Cable Co., Inc., Elmhurst, New York City.

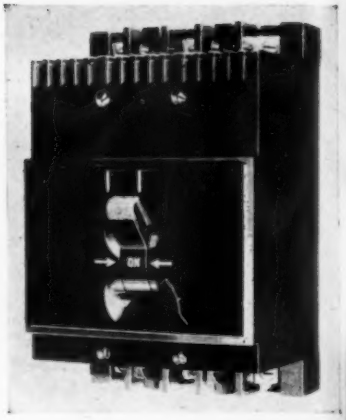
■



WESTINGHOUSE 250-WATT DOME REFLECTOR

Dome Reflector

Enclosed dome type reflector for 250-watt mercury lamp for general industrial lighting with mounting heights from 8' to 18'. Consists of 18-in. diameter porcelain enameled dome type reflector with various types of hood mountings and dust tight hinged glass cover. Provides wide uniform distribution of light and diffusing lens minimizes glare from lamp. Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.



HEINEMANN CIRCUIT BREAKER

Circuit Breaker

Milliampere circuit breaker ratings are now available on the Re-Cirk-It line of combination tumbler switch and circuit breakers. Available in either instantaneous-trip or time-delay action. Amperage ratings, as low as 50 milliamperes, make it applicable to numerous delicate circuits, particularly protection of X-ray tubes, radio equipment, electronic devices and so on. Heinemann Electric Co., Trenton, N. J.

■

Emergency Lighting

Exide Keepalite is an emergency lighting unit for smaller hospitals, theatres, auditoriums and stores. Includes 12-volt glass jar battery, automatic charging apparatus and switches necessary to provide automatic instantaneous emergency lighting protection. Provides emergency protection for two operating lights and general illumination in eight rooms or operating suite including accident dispensary. Automatically provided when normal electric service is interrupted. Battery is automatically kept charged and has a life of five to seven years. Circuits are permanently installed. High intensity bulbs are used. Emergency bulbs may be made part of regular lighting fixtures. Electric Storage Battery Co., Philadelphia, Pa.

ELECTRIC STORAGE EXIDE KEEPALITE

You can see at a Glance

. . . how these hollow cells facilitate modern wiring!

THE Robertson Steel Floor is made up of hollow, parallel ells. Each hollow cell may serve as protected wireway of generous roportion for wiring distribution. he introduction of this new, more exible method of wiring means ster jobs, better layouts, and elimiates the danger of buildings grow- g electrically obsolete before their me.

Structurally, too, the Robertson eel Floor is outstanding. It is mpact, light in weight, and yet ceptionally strong. It is easy to stall, corrosion and fire resistant. Find out for yourself the new electrical possibilities the Robertson Floor offers. Write today for our book "Wiring Robertson Cellular Steel Floor." Here you will find detailed layout, engineering, and installation data. There is no obligation. Send the coupon today.

•

WITH THE ROBERTSON STEEL FLOOR SYSTEM *you can give your customers' buildings ceiling, lights and floor outlets any place desired, not only when the building is erected, but later when usage demands changes.*

•

H. H. Robertson Company,
2003 Grant Building, Pittsburgh, Pa.
Please send me, without obligation, your new book entitled "Wiring Robertson Cellular Steel Floor."
Name_____
Address_____
City_____ State_____

ROBERTSON STEEL FLOOR SYSTEM

MINERALLAC HANGER

Conduit 3/8"—2 1/2"
Cable to 2 1/8" (with Bushings)

MINERALLAC JIFFY CLIP

Sizes from .250" O.D. Tubing to 1 1/4" conduit.

See your Jobber

New York City Office
Theodore B. Dally
50 Church Street

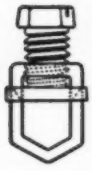
MINERALLAC ELECTRIC CO.
25 N. Peoria St., CHICAGO

SIMPLE, ISN'T IT?

ILSCO

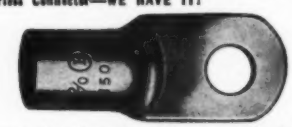
SOLDERLESS CONNECTOR

NOTICE: The ***triangular wedge*** formed by the tang and V-bottom collar, which forces the wire into a ***solid mesh***—



NO set-screw contact . . .
NO flattening or separating of wires . . .
NO limitation to one size wire . .
NO shearing effect whatsoever . .
NO special tools required to make connection . . .

NO need for you to search any longer for the PERFECT Solderless Connector—WE HAVE IT!



Ilsco solder lugs show the size of the largest wire they will take.

FREE—A large display board, containing mounted samples of ILSCO lugs. Sent upon request.

ILSCO COPPER TUBE & PRODUCTS, INC.
5629 Madison Road. Cincinnati, Ohio

EQUIPMENT News

[FROM PAGE 176]

Pipe Cut-off Attachment

An addition has been made to the Beaver Model-A pipe machine which makes wheel-and-roller or knife cut-off attachments optional, depending on the type of work involved. The knife cut-off takes from ¼ to 2-in. pipe, and is recommended for electrical conduit, or where pipes must be scarfed for welding or grooved for couplings. The wheel-and-roller cut-off attachment, which will cut solid round bars as well as ⅛ to 2-in. pipe, is recommended for all-purpose duty. Beaver Pipe Tools, Warren, Ohio.

BEAVER CUTOFF ATTACHMENT

■

PARAGON TIME SWITCH

Time Switch

Synchronous time switches with new case design. Drawn from 16 gauge steel, the cases are seamless. An interlocking joint between shallow cover and deeper base is made tight by a continuous cork gasket. Adaptable to both outdoor and indoor installation. Indoor models finished in satin black lacquer with chromium hinge and hasp. Outdoor type finished in weatherproof aluminum bronze and fitted with window to check operation without opening. Also have "clear-line" dial and trip assembly. One dial knob frees or locks dial to a frictionless arbor, and other one frees or locks adjustable switch-trippers. Paragon Electric Co., 37 West Van Buren St., Chicago, Ill.

New Federal No. 30 Horn
With Directional Projector

● For large plants and yards everywhere. Projects sounds in different directions. Volt 6 to 250 a. c. only . . . type C for d. c. Built to last a life time.

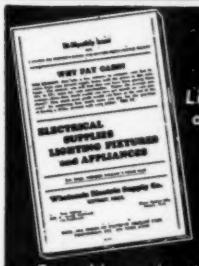
No. 30 Horn

New Federal No. 30-A
With Grille Front

● Same as No. 30 except for grille. Special steel diaphragm. Ask about New Industrial Bulletin No. 57.

FEDERAL ELECTRIC CO.
8726 So. State Street
Chicago, Illinois

No. 30-A



ELECTRICAL SUPPLIES
Lighting Fixtures and Appliances

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We give you—
—highest quality
—lowest market prices
—quick delivery

Save Money by Using Our Service
Open a Charge Account
Write for Latest 52-Page Catalog

WHOLESALE ELECTRIC SUPPLY CO
3083 E. Grand Blvd. Detroit, Mich.

Announcing . . . . .

the NEW G & R
CHUCK-GRIP CONNECTORS

Solderless and Insulated
Fully Approved
DISTRIBUTED BY WHOLESALERS

G & R ELECTRIC CO., Wilkinsburg, Pa.

A Complete Line of
TRANSFORMERS
FOR EVERY CLASS OF SERVICE

- Distribution & Power
- Pyranol Cooled
- Air Cooled General Purpose
- Current & Potential
- Auto Mercury Vapor Lamp
- Motor Starting & Signalling

THE STANDARD TRANSFORMER CO.
WARREN . . OHIO

Dining Room Fixture

New Controlens dining room unit, designed to spot 32 foot candles on center of table, 15 foot candles on outer edge and 5 foot candles on eye level. Gives general illumination by indirect lighting from ceiling and soft diffusion through luminous side panels. Available in bone white and satin chrome or bone white and gold finishes. Gruber Brothers, New York City.

GRUBER DINING ROOM UNIT

■

Flamenol Cable

Flamenol-insulated cable, is a synthetic insulating compound, recommended for power and control circuits at 600 volts and less, and for operation at a maximum copper temperature of 60 deg. C. Also adapted to machine-tool wiring, switchboard wiring and battery and coil leads. It is non-combustible and highly resistant to moisture, acids, alkalies and oils. It can be made a very soft and flexible compound or one with celluloid-like rigidity. Can be put into solution for coating or impregnating and compounded, filled, calendered and extruded in much the same fashion as rubber. Available in a variety of colors for circuit tracing. General Electric Co., Schenectady, N. Y.

■

Two-Circuit Switch

A two-circuit switch to control the new two-filament, three-light lamps having combined loads as high as 1,250 watts. First pull lights small filament, second pull turns it off and lights large filament, third pull re-lights small filament, fourth pull turns both off. Available 10-amp., 125-volts; 5-amp., 250-volts. McGill Manufacturing Co., Valparaiso, Ind.

McGILL TWO-CIRCUIT SWITCH

"THEY SAY IT WAS CROSSED WIRES

THE CONTRACTOR MUST HAVE BEEN CARELESS"

A contractor often gets blamed for a fire even though the mechanics of his work have been perfectly done. Those so ready to assign the blame fail to realize that an entirely **safe** installation can be used by unknowing persons in such ways as to create hazards.

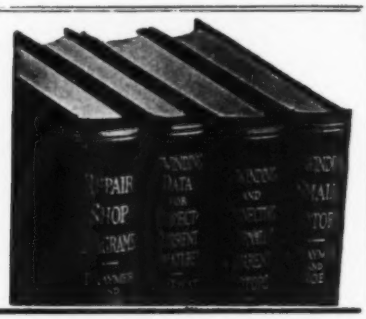
But electrical contractors are not entirely without responsibility for electrical fires which result through ignorance. Contractors, along with all other groups in the industry, have a duty to warn the householders whom they reach, against improper practices and guide them in the selection of safe equipment.

One way in which contractors can serve is to encourage the use of approved and labeled materials, particularly flexible cords. During the last six and one-half years, the Department of Streets and Electricity in Chicago reports that:

865 OUT OF 869 CORD FIRES WERE CAUSED BY CORDS OF SUB-STANDARD QUALITY

If contractors will use and encourage the use of Underwriters' labeled cords, it is likely that there will be fewer fires charged against their work. Increasing confidence in using electricity will help that much in expanding its use.

ELECTRICAL CORD MANUFACTURERS
155 East 44th St., N. Y. C.



NOW- how to repair and rewind all types of motors . . .

ELECTRIC MOTOR REPAIR LIBRARY

4 volumes, $10.00, payable in easy monthly installments

THIS set of books should be on the shelf of every man who ever has to touch a motor for purposes of repairing it or changing it to meet different operating conditions. In shop language and with practical shop methods it covers every step in stripping, rewinding and connecting a.c. and d.c. motors of all kinds.

Do you know how to:

—lay out a wave winding
—test a.c. and d.c. motors to locate grounds, shorts opens, quickly and positively
—properly record data when stripping armatures so that it will be instantly usable for correct rewinding by yourself or any experienced winder at any time afterward
—determine how many coils can safely be cut out
—lay out single-phase fan motor windings
—change single-phase windings for two- or three-phase operation
—make cross or equaliser connections on lap windings
—lay out frog-leg windings
—handle every step in a rewinding job from the time it comes into the shop until it leaves
—wind stators for turbogenerators
—hand high-speed armatures
—rewind motors for voltage, speed, frequency, or cycle changes
—etc., etc., etc.

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EQUIPMENT NEWS

[FROM PAGE 179]

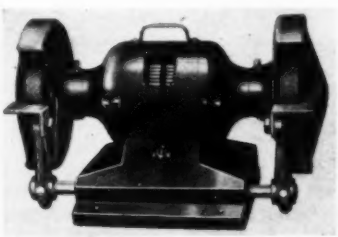
Washer Punch

Punch cuts washers out of metal, fabric, gasket material, fibre, steam packing, straw-board, asbestos, leather, felt, cork, rubber, bakelite, mica and any other similar material up to $\frac{1}{16}$-in. thickness. With 18 hardened dies furnished with machine, it is possible to obtain 150 different washer sizes. Valuable in tool plants, repair, maintenance, machine shops, experimental departments. Dies mounted in eccentric turret plate. Centering system insures concentric punching. Ideal Commutator Dresser Co., Sycamore, Ill.

IDEAL COMMUTATOR WASHER PUNCH

Electric Grinder

A bench tool for general grinding and polishing operations in woodworking plants, factories, machines shops, garages. Cast iron base fastens firmly to bench or table, with portability provided by handle secured to motor yoke. Adjustable steel tool rests may be set in any position. Steel wheel guards gives protection to operator. Capacity of $\frac{1}{4}$ hp., 3450 r.p.m. for 110-volt, 60 cycle, single phase a.c. operation. Motors equipped with dust sealed ball bearings, start-and-stop switch mounted in base, and 10-ft. rubber covered, cord and plug. Diehl Manufacturing Company, Elizabethport, N. J.



DIEHL ELECTRIC GRINDER

Users of Acme Fire Alarm Apparatus

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Ford Motor Company
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Rockefeller Institute of Medical Research
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Columbia University
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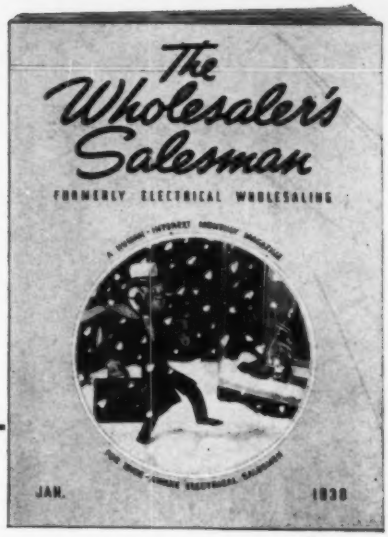
ELECTRICAL CONTRACTING

Featuring informal photos, comments, and digests of NECA committee reports

P.S. to MANUFACTURERS

PLENTY OF READER INTEREST IN THIS ISSUE! BE SURE YOUR SALES MESSAGE IS INCLUDED!

NEWS FOR MANUFACTURERS



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Inquire for detailed information and rates—then include it on your 1938 schedule.

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ABC — ABP

UMI

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